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Memoirs of the Museum of Comparative Zoölogy
AT HARVARD COLLEGE
Vol. XXXV. No. 4.

REPORTS ON THE SCIENTIFIC RESULTS OF THE EXPEDITION TO THE TROPICAL PACIFIC, IN CHARGE OF ALEXANDER AGASSIZ, BY THE U. S. FISH COMMISSION STEAMER "ALBATROSS," FROM AUGUST, 1899, TO MARCH, 1900, COMMANDER JEFFERSON F. MOSER, U. S. N., COMMANDING.

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XXVII.

THE SCHIZOPODA.

By H. J. HANSEN.

WITH TWELVE PLATES.

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CAMBRIDGE, U. S. A.:
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INTRODUCTORY REMARKS.

The collection dealt with in the present paper is extremely large, both as to the number of species, sixty-three, and especially as to the numbers of the specimens of the major part of the forms. A small portion of the material was captured by the late Alexander Agassiz near the Fiji Islands in 1897, a still smaller lot was secured during the trip of the "Albatross" in 1899–1900, but the vast majority has been collected by Dr. Agassiz in 1904–1905 in the Eastern Pacific. When we wish to get a closer insight into the whole topic it is, however, necessary to consider separately the two orders still not infrequently united under the name Schizopoda, viz. Mysidacea and Euphausiacea. And a comparison with the results of the exploration of the Dutch "Siboga" Expedition in the Indian Archipelago is interesting.

Of the order Mysidacea only twenty-three species are at hand, fifteen of which were secured in 1904–1905, while the remaining eight forms were exclusively gathered during the earlier trips just mentioned. Fifteen species in all from the Expedition in 1904–1905 is in reality a small number as compared with the number of species already known of this order. But the explanation of this fact is given below, and when we consider the order Euphausiacea the aspect is quite different. Of the last-named order the collection contains forty species, all with a single exception taken in 1904–1905 (some among them besides in 1899–1900 or off the Fiji Islands), but as only seventy-three species of this order are known from all seas, it will be seen that Dr. Agassiz during that single Expedition captured more than half of the world's fauna. The "Siboga" gathered only twenty-five species of Euphausiacea but no less than forty-seven species of Mysidacea. The explanation of this startling difference between the results of the Agassiz Expedition of 1904–1905 and the "Siboga" Cruise is that the Euphausiacea are nearly all true oceanic forms, while the majority of the Mysidacea either inhabit shallow water, or live pelagically, or not far from the bottom to a few hundred fathoms and within no very great distance from land. And while the "Siboga" in the main explored the straits and comparatively

smaller seas between the innumerable islands in the Indian Archipelago, the Agassiz Expedition of 1904–1905 had the great majority of its Stations in the open ocean and far from any coast.

On the Mysidacea at hand some remarks may be added. The eight species not captured in 1904–1905 are small, pelagic forms taken near, or at most only some miles from the coast; four among them are new, and one of these differs so much from earlier known forms that it was necessary to establish a new genus for its reception. Of the fifteen species taken in 1904–1905 four are new; three of these belong to well-known genera, while a new genus is established for the fourth. But by far the most important gain was the capture of *Chalaraspis alata* (Will.-Suhm, MS.) G. O. Sars. This genus as defined by Sars with its single species has been described by him from a couple of sketches drawn by Willemoës-Suhm during the "Challenger" Expedition, as the single specimen had been lost. The genus belongs to the interesting suborder Lophogastrida, comprising in all only six genera; the Agassiz Expedition secured some specimens of Chalaraspis, and among them an adult male, thus rendering it possible to give a detailed account of this hitherto rather enigmatic type.

The material of Euphausiacea is, as already stated, very rich, and besides it is important in various respects. Among its forty species six could not be referred to earlier established forms, but in a paper published in May, 1911,[1] I have given preliminary descriptions of these, and other, new species. Perhaps one might expect that the number of undescribed species had been considerably higher, but in the years 1905–1910 I had established a comparatively large number of species of this order on animals from the Atlantic or the Indian Archipelago; the major part of the species of the order have a very large or frequently even vast distribution, and consequently more than three fourths of the Euphausiacea from the East Pacific were known before from the Indian Archipelago ("Siboga") or from the Atlantic, or from both Oceans. But the collection made it possible to extend our knowledge of the distribution of the major part of the species very much; furthermore, as the material, of nearly all the new species, and besides of several earlier established but hitherto imperfectly known species, is rich and generally well preserved, it was possible to give a full account of these forms. And without entering into other points elucidated by the collection, for instance, the distribution of many of the species within the area explored, geographical variation of some forms, etc., another

[1] H. J. Hansen: The Genera and Species of the Order Euphausiacea, with Account of remarkable Variation. Bull. Mus. Océan. Monaco, No. 210.

consideration ought to be pointed out. In the Synopsis mentioned (1911) I set forth several reasons for the belief "that comparatively few, probably not a dozen, species in the oceans of the globe are still undiscovered." And if that view be correct it must be admitted that the results of the Agassiz exploration in 1904–1905 are as to this order of Crustacea wonderfully rich, because during that trip thirty-nine species were collected, thus a little more than half of the species hitherto known — and not far from half of the species really existing!—The collection contains besides a large number of larvae, of Euphausiacea, but on this topic it may be sufficient to refer to my remarks in the chapter on the larval stages (p. 283–294).

As to the classification of the Mysidacea and some characters in the Euphausiacea — especially the important copulatory organs of first pair of pleopods in the male — I may refer to the account in my paper on the "Siboga" Schizopoda frequently quoted on the following pages. Only a few points may be added. Recently I found that in some genera (Thysanopoda, Nematoscelis, and Nematobrachion) the maxillulae afford valuable specific characters or characters for groups of species belonging to the same genus, furthermore that in a few genera the maxillae show specific differences of some interest, finally that in the genus Nematoscelis the thoracic legs afford excellent characters for dividing the genus into two natural groups.— The nomenclature of the cephalothoracic appendages in the two orders is identical with that applied in the "Siboga" paper.

The geographical distribution of each species is mentioned. I have attempted in all cases to give a full abstract of all trustworthy statements in the literature, but as to several species of various genera (Euphausia, Nematoscelis, Stylocheiron) most of the earlier statements had to be discarded as the species in question were "collective." I have added a good many statements based on the material of the Copenhagen Museum, but do not think it well to insert still unpublished results based on collections to be reported on in the near future, namely those from the Swedish Antarctic Expedition, from the U. S. National Museum, etc.

And now I may express my deep regret that Dr. A. Agassiz did not live to see the publication of this paper, because it would certainly have been a satisfaction for that great explorer to see how rich his collection of these groups of Crustacea and especially of the oceanic Euphausiacea in reality was and how important it proved for the advancement of this branch of zoölogical science.

Finally I desire to render my sincere thanks to the authorities of the Museum of Comparative Zoölogy for their friendliness, and especially for allowing me to employ my two very able countrymen, Mr. T. N. Möller, the engraver, and Mr. J. Bech, the copper-plate printer, for the reproduction of my drawings.

Copenhagen, Sept. 18, 1911.

THE SCHIZOPODA.

I. The Order MYSIDACEA.

A. Suborder LOPHOGASTRIDA.

CHALARASPIS Willemoës-Suhm (1875).

Description.— Integument soft. Carapace thin, submembranaceous, without processes, anteriorly produced as a very broad but somewhat short frontal plate (Plate 1, fig. 1a), and with the postero-lateral rounded wings reaching to the end of the thorax or a little more backwards; the cervical groove very strong.

Eyes small, light reddish. Antennular peduncles (figs. 1a–1b) short and extremely thick; inner flagellum thin, about as long as the peduncle.— Antennal squama not jointed, with the outer margin serrate beyond the middle (fig. 1e).— Maxillulae (fig. 1c) without palp and without setae or spines on the inner lobe.— Maxillae (fig. 1f) somewhat reduced; the lobe from second (I^2) and third (I^3) joint distally rounded, undivided; the palp (p) very short, unjointed, and scarcely marked off; the exopod strongly developed, very broad.— Maxillipeds (fig. 1g) with the exopod about as long as the endopod, which distally is a little broader than in Lophogaster.

Gnathopods slightly shorter than the following pair of legs, shaped as in Lophogaster, with the seventh joint somewhat thick, a little curved, distally rounded, and strongly setose.— Legs somewhat slender, and the last pair (fig. 1i) considerably thinner than the first (fig. 1h) or second pair; claw long or very long, thin; exopod well developed in all pairs (the ovigerous female is unknown).

Sixth abdominal segment with two pairs of acute teeth from the lateral margin (fig. 1k), but the segment is not divided into two sections by any suture. Uropods with the endopod slightly overreaching the telson and a little longer than the exopod, which is not jointed towards the end (fig. 1l). Telson (fig. 1l) oblong-triangular, with the narrow end truncate, with lateral spines, and a couple of dorsal keels.

Remarks.— This genus is perhaps more allied and similar to Lophogaster M. Sars than to any other genus of the suborder; from the genus named it is, however, easily distinguished by the shape of the frontal plate, the reduced eyes, the less developed maxillae, the long uropods, etc. As to the use of the

name Chalaraspis I follow Sars (Challenger Rept., p. 51). Willemoës-Suhm left two figures of a species to which he had given the name *Chalaraspis alata*. The only specimen obtained by the "Challenger" had been lost, and therefore Sars described the genus and the species from the drawings made by Suhm. The drawings have been rendered as woodcuts by Sars; they were evidently somewhat imperfect or inaccurate in several particulars. The figures show the animal as having the carapace exceedingly large, covering the two anterior abdominal segments and the lateral part of third segment. Among the "Albatross" material I found specimens agreeing tolerably with Suhm's figures in all main features excepting the relative length of the carapace, but as specimens of allied genera, Gnathophausia and Eucopia, sometimes are contracted to such a degree that the carapace covers two segments of the abdomen, no stress can be laid on the apparently very long carapace shown by Suhm's drawings, as his specimen in all probability has been very much contracted. And Sars's diagnosis of the genus agrees, so far as it goes, in the main with the description founded on my specimens.

1. **Chalaraspis alata** Willemoës-Suhm, MS. G. O. Sars.

Plate 1, figs. 1a–1l.

1885. *Chalaraspis alata* G. O. Sars, Challenger Rept., **13**, p. 51. (Two text-figures).

Sta. 4665. Nov. 17, 1904. Lat. 11° 45′ S., long. 86° 5.2′ W. 300 fms. to surface. 1 very young specimen.

Sta. 4672. Nov. 21, 1904. Lat. 13° 11.6′ S., long. 78° 18.3′ W. Top of Tanner net, 400 fms. to surface. 2 immature specimens (bad).

Sta. 4675. Nov. 22, 1904. Lat. 12° 54′ S., long. 78° 33′ W. 300 fms. to surface. 1 immature specimen.

Sta. 4719. Jan. 14, 1905. Lat. 6° 29.8′ S., long. 101° 16.8′ W. 300 fms. to surface. 1 male.

Description.— General aspect somewhat similar to that of Lophogaster.— The frontal plate somewhat short but very broad, with the anterior transverse margin straight or even slightly emarginate and the lateral angles broadly rounded (figs. 1a–1b). The carapace has the cervical groove not only deep but very curiously shaped; seen from the side (fig. 1b) the groove seems to be formed by two transverse furrows which unite laterally, while the anterior furrow is again dorsally bifid; on the side the furrow is bent and is far from reaching the lower margin of the carapace. A little more than the anterior fourth of the lateral margin of the carapace is hollowed in a peculiar way, and somewhat above the whole lateral margin a furrow runs from near the front to the hind margin. Between the antero-lateral rounded angles of the frontal plate and the cervical groove a pair of feeble longitudinal keels are seen (fig. 1a), and the area between these keels is feebly concave; a branchial groove is feebly developed, and rarely the posterior third of the carapace has the middle line

distinctly keeled. The postero-lateral part of the carapace at each side is somewhat produced backwards and rounded as in Eucopia.

The eyes (fig. 1b, o.) are small, a little compressed, seen from above (fig. 1a) oblique-ovate, light reddish.— The antennular peduncles short and extremely thick; second joint with an oblong, slender, moderately short process on the outer side; third joint with the front margin projecting in an oblong, very acute process above the insertion of the upper flagellum and a somewhat similar process more downwards on the inner side of the joint; the upper flagellum thin, with numerous joints and about as long as the peduncle; lower flagellum very strong.— Last joint of the antennal peduncle with a small process on the outer side just below the insertion of the squama; the squama itself is a thin plate reaching somewhat beyond the end of the antennular peduncle, it is somewhat more than twice as long as broad (fig. 1c) with the inner margin very convex and setose, the outer margin a little bent angularly near or a little beyond the middle and its proximal part glabrous, the distal part serrate with 9–12 acute saw-teeth somewhat different in size.

The five anterior abdominal segments somewhat thick, dorsally flatly convex, and some among them even with a small, a little excavated dorsal area; lateral plates of the anterior segments rounded, on fifth, and sometimes on fourth, segment the postero-lateral angle is produced in a tiny or small, acute tooth. Sixth segment about as long as the fifth, with two pairs of obliquely transverse, somewhat short and shallow furrows; the two pairs of lateral teeth very acute. The uropods (fig. 1l) with the endopods slightly overreaching the telson and a little longer than the exopod, which has the end truncate and three or four faint serrations along the outer margin. Telson (fig. 1l) very oblong-triangular, scarcely three times as long as broad, above with a pair of high, longitudinal, very feebly serrate keels a little from the lateral margins, and the area between these keels excavated longitudinally; the distal half of each lateral margin with 5 or 6 spines; the end of the telson truncate, but hairs or spines wanting — perhaps lost?— in the specimens.

Length of the largest specimen, a probably adult male, 35 mm.

Remarks.— I do not entertain the slightest doubt that the species described here is *C. alata*. And I think it very important that it has been possible to fill the gap in our knowledge of the only hitherto imperfectly studied genus of the small but highly interesting suborder Lophogastrida.

Distribution.— The "Challenger" specimen was taken in the South Pacific: "lat. 50° 1′ S., long. 123° 4′ E.; depth, 1800 fathoms." It is certainly a bathypelagic form.

GNATHOPHAUSIA Willemoës-Suhm (1875).

The material is scanty, consisting of seven specimens belonging to three well-known species.

2. **Gnathophausia ingens** (Dohrn).

1870. *Lophogaster ingens* Dohrn, Zeitschr. wiss. Zool., **20**, p. 610; taf. 31, figs. 12–14.
1885. *Gnathophausia ingens* G. O. Sars, Challenger Rept., **13**, p. 30, pl. 2.
—— *Gnathophausia calcarata* G. O. Sars, Challenger Rept., **13**, p. 35, pl. 4.
1891. *Gnathophausia bengalensis* Wood-Mason, Ann. Mag. Nat. Hist., ser. 6, **8**, p. 269.
1906. *Gnathophausia ingens* Ortmann, Proc. U. S. Nat. Mus., **31**, p. 28.
—— *Gnathophausia calcarata* Ortmann, Proc. U. S. Nat. Mus., **31**, p. 30, pl. 1, figs. 2a, 2b.

Sta. 3681. Aug. 27, 1899. Lat. 28° 23′ N., long. 126° 57′ W. 350 fms. to surface. 1 specimen.

Remarks.— The specimen, which measures about 68 mm., agrees well with Ortmann's description of *G. calcarata* G. O. S. Dr. A. Alcock kindly sent me Wood-Mason's type of *G. bengalensis* and I can confirm Ortmann's interpretation that it is identical with *G. calcarata*. Wood-Mason said that "the upper lateral keels are strongly roof-shaped," but Ortmann was unable to understand the meaning of this sentence; I suppose, however, that Wood-Mason intended to say that the keels in question protrude laterally as eaves above the vertical sides of the carapace, when this is seen from behind or in an optic transverse section.

Ortmann (l. c., p. 28–30 and p. 34) was of the opinion that *G. ingens* (Dohrn) G. O. Sars, is the full-grown female of *G. calcarata* (Will.-Suhm, MS.) G. O. S., and I am able to add three points corroborating his view. I examined Sars's "Challenger" specimens of *G. ingens* (Dohrn) in the British Museum and found that it possessed the two pairs of oblique keels on the upper surface of the carapace, these keels being even well developed and completely similar to those on the type of *G. calcarata*; Ortmann rightly supposed that these keels had been overlooked by Dohrn and Sars. Furthermore Sars's figure of the ventral epimeral plates of the sixth abdominal segment in *G. ingens* is incorrect; the slit between the two posterior lobes of the plate is longer and narrower in proportion to the breadth of the lobes than in his fig. 6 (Pl. II), and, what is of more importance, each lobe has its outer terminal angle produced into a somewhat short, pointed tip, while the inner terminal angle at the slit is acute but very slightly produced, thus situated somewhat in front of the outer tip and shaped about as in *G. calcarata*, but differing notably from Sars's fig. 6 of *G. ingens*. Finally Sars says in the diagnosis of *G. ingens*: "branchiostegal spines obsolete," but he overlooked that these spines had been broken off in his specimen. I think one is now justified in adopting Ortmann's supposition and may safely take the step to withdraw *G. calcarata*, considering it only as a synonym.

Distribution.— According to the literature this species is known from off the West coast of Africa, "Laos," from the Gulf of Mexico, the Bay of Bengal, the Arafura Sea, South of Mindanao, the Hawaiian Islands, and is common in the California region in the East Pacific.

3. **Gnathophausia gracilis** Willemoes-Suhm.

1875. *Gnathophausia gracilis* Willemoës-Suhm, Trans. Linn. Soc. London, ser. 2, **1**, p. 33, pl. 9, fig. 1.
1885. *Gnathophausia gracilis* G. O. Sars, Challenger Rept., **13**, p. 48, pl. 7, figs. 6–10.
1891. *Gnathophausia brevispinis* Wood-Mason & Alcock, Ann. Mag. Nat. Hist., ser. 6, **7**, p. 269.
1895. *Gnathophausia brevispinis* Faxon, Mem. Mus. Comp. Zool., **18**, p. 216, pl. J.
1906 *Gnathophausia gracilis* Ortmann, Proc. U. S. Nat. Mus., **31**, p. 39.

Sta. 4651. Nov. 11, 1904. Lat. 5° 47.1′ S., long. 82° 59.7′ W. 2222 fms., trawl. 1 specimen.
Sta. 4652. Nov. 11, 1904. Lat. 5° 44.7′ S., long. 82° 39.5′ W. 400 fms. to surface. 1 small specimen.
Sta. 4656. Nov. 13, 1904. Lat. 6° 51.6′ S., long. 83° 34.3′ W. 2222 fms., trawl. 1 specimen.
Sta. 4709. Dec. 30, 1904. Lat. 10° 15.2′ S., long. 95° 40.8′ W. 2035 fms., trawl. 1 specimen.
Sta. 4715. Jan. 2, 1905. Lat. 2° 40.4′ S., long. 90° 19.3′ W. On way up from 1743 fms. 1 specimen

Remarks.— The largest specimen, a male from Sta. 4709, is 69 mm. long; a female with the marsupium well developed (from Sta. 4656) is 65 mm. long, and another female with marsupium (from Sta. 4715) is 62 mm. These three large specimens have on the gastric area an oblong, rather high, lamellar, subtriangular, dentate crest terminating in a spiniform process; besides they have the lateral plates of the five anterior abdominal segments expanded posteriorly; the expansion of the plates of first segment is small in the two females, moderately large in the male, and the expansions increase in all three specimens gradually and considerably in size from first to fourth segment, while those of the fifth segment are somewhat smaller. In the smallest specimen, measuring 25 mm., the anterior dorsal spine on first abdominal segment is extremely small, the lateral plates of the abdominal segments are not expanded posteriorly, and the lamellar crest on the gastric area is rudimentary with a small spine above; in the fifth specimen, which is 37 mm. long, the last-named lamellar crest is developed nearly as in the large specimens, but the lateral plates of the second to the fifth abdominal segments are very feebly expanded.

I have examined the type-specimen of Willemoës-Suhm and G. O. Sars; it measures 41 mm. and is preserved in the British Museum. It has on the gastric region a small, oblong, triangular, lamellar plate with a spine on the vertex and a little farther behind there are four small saw-like teeth in a longitudinal row; furthermore the lateral plates of the abdominal segments are feebly expanded nearly as in the above mentioned specimen measuring 37 mm. Dr. Alcock loaned me the type of *G. brevispinis*, and an examination gave the

result that it is identical with *G. gracilis* Will.-Suhm, as already pointed out by Ortmann.

Ortmann's elaborate account of this characteristic species is very good; my own examination of the types corroborates his statements and critical remarks. The study of the five specimens from the Agassiz collection and the two types mentioned shows that the lamellar crest is well developed both in full-grown and a little more than half-grown specimens, but rudimentary in a much smaller specimen, while the expansion of the lateral plates of the five abdominal segments is well developed only in full-grown specimens and feebly developed in specimens measuring 37–41 mm. in length. It may be added that the anterior dorsal spiniform process on first abdominal segment is always much smaller than the posterior, but proportionately considerably longer in large than in small specimens. The character pointed out by Ortmann that "there are two triangular, pointed epimeral lappets on each side of the anterior part of the sixth segment" is very interesting.

Distribution.— According to the literature this species has a wide distribution:—Atlantic at Lat. 1° 22′ N., long. 26° 36′ W., Bay of Bengal, off Galapagos, off Panama, and off Central California. It is a bathypelagic species, taken in depths from more than 600 to more than 2000 fathoms to surface, the only exception being the small, not half grown specimen from Sta. 4652 taken in 400 fathoms to surface.

4. **Gnathophausia zoëa** Willemoës-Suhm.

1875. *Gnathophausia zoëa* Willemoës-Suhm, Trans. Linn. Soc. London, ser. 2, **1**, p. 32, pl. 9, figs. 2–15; pl. 10, fig. 4.
1885. *Gnathophausia zoëa* G. O. Sars, Challenger Rept., **13**, p. 44, pl. 6, figs. 6–10.
—— *Gnathophausia willemoesii* G. O. Sars, Challenger Rept., **13**, p. 38, pl. 5, figs. 1–6.
1891. *Gnathophausia sarsi* Wood-Mason and Alcock, Ann. Mag. Nat. Hist., ser. 6, **7**, p. 187.
1906. *Gnathophausia zoëa* Ortmann, Proc. U. S. Nat. Mus., **21**, p. 42.
1908. *Gnathophausia zoea* H. J. Hansen, The Danish Ingolf-Exp., **3**, 2, p. 93, pl. 4, figs. 3a–3c.
1910. *Gnathophausia zoea* H. J. Hansen, Siboga-Exp., **37**, p. 17.

Sta. 4641. Nov. 7, 1901. Lat. 1° 34.4′ S., long. 89° 30.2′ W. 633 fms., trawl. 1 specimen.

Remarks.— As to variation, size, etc., of this species I refer to Ortmann's paper and to the remarks in my two recent treatises. The specimen from the Agassiz Expedition is about half grown and shows nothing of interest.

Distribution.— This species is common in the tropical and northern temperate Atlantic, where it is found northwards even to West of Iceland: Lat. 64° 45′ N., long. 29° 06′ W. (Ingolf-Exp.); it has been taken in the Bay of Bengal, in the Indian Archipelago, and is widely distributed in the tropical and northern temperate Pacific. Detailed statements on the geographical and bathymetrical occurrence are found in Ortmann's paper and in my two recent reports.

EUCOPIA Dana (1852).

The genus comprises four species, three of which are represented in this collection. In the account of the "Siboga" Schizopoda I have given an analytical key to the species and have dealt with the synonymy.

5. **Eucopia unguiculata** (Willemoës-Suhm).

1875. *Chalaraspis unguiculata* Willemoës-Suhm, Trans. Linn. Soc. London, ser. 2, **1**, p. 37–40, pl. 8 (partim).
1905. *Eucopia unguiculata* H. J. Hansen, Bull. Mus. Océan. Monaco, no. 42, p. 3.
1910. *Eucopia unguiculata* H. J. Hansen, Siboga-Exp., **37**, p. 20, pl. I, fig. 3a.

In this list I do not include Sars's account of his *Eucopia australis* Dana in the "Challenger" Rept., p. 55, pls. 9–10, because he, as pointed out in the "Siboga" paper, has confused three species, viz. *E. australis* Dana with figs. 1–2 on his pl. 9, *E. sculpticauda* Faxon, to which his figures 13–17 on pl. 10 belong, and *E. unguiculata* Will.-Suhm, to which at least the majority of his other figures belong.

Sta. 4646. Nov. 8, 1904. Lat. 4° 1.6′ S., long. 89° 16.3′ W. 300 fms. to surface. 1 specimen.
Sta. 4650. Nov. 10, 1904. Lat. 5° 22′ S., long. 84° 39′ W. 300 fms. to surface. 1 specimen.
Sta. 4652. Nov. 11, 1904. Lat. 5° 44.7′ S., long. 82° 39.5′ W. 400 fms. to surface. 1 specimen.
Sta. 4655. Nov. 12, 1904. Lat. 5° 57.5′ S., long. 80° 50′ W. 400 fms. to surface. 1 specimen.
Sta. 4664. Nov. 17, 1904. Lat. 11° 30.3′ S., long. 87° 19′ W. 300 fms. to surface. 1 specimen.
Sta. 4667. Nov. 18, 1904. Lat. 11° 59.5′ S., long. 83° 40.4′ W. 300 fms. to surface. 5 specimens.
Sta. 4668. Nov. 19, 1904. Lat. 12° 9.3′ S., long. 81° 45.2′ W. Bottom of Tanner net, 300 fms. 1 specimen.
Sta. 4669. Nov. 19, 1904. Lat. 12° 12.7′ S., long. 80° 25.6′ W. 300 fms. to surface. 6 specimens.
Sta. 4671. Nov. 20, 1904. Lat. 12° 6.9′ S., long. 78° 28.2′ W. 300 fms. to surface. 8 specimens.
Sta. 4672. Nov. 21, 1904. Lat. 13° 11.6′ S., long. 78° 18.3′ W. 400 fms. to surface, Tanner net, closed bottom. 1 specimen.
Sta. 4676. Dec. 5, 1904. Lat. 14° 28.9′ S., long. 81° 24′ W. 300 fms. to surface. 3 specimens.
Sta. 4679. Dec. 7, 1904. Lat. 17° 26.4′ S., long. 86° 46.5′ W. 300 fms. to surface. 1 specimen.
Sta. 4716. Jan. 2, 1905. Lat. 2° 18.5′ S., long. 90° 2.6′ W. 600 fms. to surface. 1 specimen.

Remarks.— The largest specimen, an adult male from Sta. 4676, measures 33 mm. in length, and is thus uncommonly large; the largest female with marsupium, from Sta. 4655, is 32 mm. long.

Distribution.— The species is common in the Western Mediterranean and the northern temperate Atlantic and extends far northwards, as it has been taken in the Davis Straits at Lat. 64° 50′ N. and West of Iceland at Lat. 64° 38′ N., long. 32° 37′ W. (Ingolf-Exp.). It is known from some localities in the Indian Archipelago; as shown above, it is not uncommon in a good portion South of Lat. 4° S. of the area explored in 1904–1905, and it is probably widely distributed in the tropical and temperate Pacific; Ortmann (1906) records a specimen from

North Coronado Island, California. Its distribution southward in the three large Oceans is still unknown. The majority of the localities enumerated in the literature by the authors until July 1905 for *E. australis* Dana certainly belong to *E. unguiculata*, but some among them to *E. major* or *E. australis*, and all specimens referred before July 1895 to *E. australis* should be reëxamined. The real *E. australis* Dana is a very large Antarctic species. The species has, as far as I know, never been taken near the surface.

6. **Eucopia major** H. J. Hansen.

1910. *Eucopia major* H. J. Hansen, Siboga-Exp., **37**, p. 21, pl. 1, figs. 4a–4b.

Sta. 4645. Nov. 8, 1904. Lat. 3°37.6′ S., long. 89° 13.1′ W. 1955 fms., trawl. 1 specimen (only a fragment).
Sta. 4651. Nov. 11, 1904. Lat. 5° 41.7′ S., long. 82° 59.7′ W. 2222 fms., trawl. 2 specimens.
Sta. 4742. Feb. 15, 1905. Lat. 0° 3.4′ N., long. 117° 15.8′ W. 2320 fms., trawl. 1 specimen.

Remarks.— This species was established on a badly preserved female with marsupium secured by the "Siboga" and measuring 42 mm. in length. The specimens from the Pacific are also badly preserved; a male, from Sta. 4651, is 58 mm. long, and a female, from Sta. 4742, with the marsupial plates perhaps not fully developed is even about 60.5 mm. But I am inclined to think that these specimens had been a little shorter in the living state than in their present bad and seemingly extended condition.

The species is easily separated from *E. unguiculata* by its much larger size, the largest specimen recorded of the last-named species was only 38 mm., and especially by having its short eyes looking forwards, occupying less than one fourth of the outer margin of the whole appendage (stalk + cornea), while in *E. unguiculata* the cornea looks in the main outwards and occupies more than one third, frequently about two fifths, of the same outer margin. *E. major* is readily distinguished from *E. australis* Dana by having the terminal joint of the exopod of the uropods distinctly broader than long, while in *E. australis* it is longer than broad; besides the eye-stalks are proportionately longer and narrower in *E. australis* than in *E. major*.

Distribution.— A single specimen was captured in the Indian Archipelago by the "Siboga," and in 1910 some specimens were secured by the Prince of Monaco in the Atlantic West of Southern Spain. In 1906 Ortmann enumerated six localities in the North Pacific northwards to Lat. 56° 12′ N. and one locality in the West Indies for *E. australis*, but as *E. australis* Dana is an Antarctic species his determinations cannot be correct. As he had separated *E. unguiculata* from his *E. australis* I think that the specimens from his seven

localities belong either all to *E. major* or some to *E. major* and others either to a hitherto undescribed species or that they are young specimens of *E. sculpticauda* Faxon.

7. **Eucopia sculpticauda** Faxon.

1893. *Eucopia sculpticauda* Faxon, Bull. Mus. Comp. Zoöl., **24**, p. 218.
1895. *Eucopia sculpticauda* Faxon, Mem. Mus. Comp. Zoöl., **18**, p. 219, pl. K, figs. 2, 2d; pl. 53, figs. 1–1d.
1905. *Eucopia intermedia* H. J. Hansen, Bull. Mus. Océan. Monaco, no. 30, p. 5, figs. 2–3. (Young).
1905. *Eucopia sculpticauda* H. J. Hansen, Bull. Mus. Océan. Monaco, no. 30, p. 6–7; fig. 4.

Sta. 4645. Nov. 8, 1904. Lat. 3° 37.6′ S., long. 89° 43.1′ W. 1955 fms., trawl. 1 adult female.
Sta. 4648. Nov. 9, 1904. Lat. 4° 43′ S., long. 87° 7.5′ W. 300 fms. to surface. 1 young specimen.
Sta. 4652. Nov. 11, 1904. Lat. 5° 44.7′ S., long. 82° 39.5′ W. 400 fms. to surface. 4 specimens (1 female with marsupium, 3 young specimens).
Sta. 4657. Nov. 13, 1904. Lat. 7° 12.5′ S., long. 81° 9′ W. 300 fms. to surface. 2 young specimens.
Sta. 4664. Nov. 17, 1904. Lat. 11° 30.3′ S., long. 87° 19′ W. 300 fms. to surface. 2 young specimens.
Sta. 4667. Nov. 18, 1904. Lat. 11° 59.5′ S., long. 83° 40.4′ W. 300 fms. to surface. 1 young specimen.
Sta. 4676. Dec. 5, 1904. Lat. 14° 28.9′ S., long. 81° 24′ W. 300 fms. to surface. 1 young specimen.
Sta. 4715. Jan. 2, 1905. Lat. 2° 20.4′ S., long. 90° 19.3′ W. 300 fms. to surface. 1 young specimen.
Sta. 4721. Jan. 15, 1905. Lat. 8° 7.5′ S., long. 104° 10.5′ W. 2084 fms., trawl. 2 adult females.
Sta. 4724. Jan. 17, 1905. Lat. 11° 13.1′ S., long. 109° 39′ W. 1841 fms., trawl. 1 adult female.

Remarks.— As already mentioned in the "Siboga" paper *E. intermedia* is only the young, differing from large or adult specimens in having the telson scarcely or not at all constricted a little before the tip and without any network of ridges on a portion of its surface, furthermore by having the first pair of thoracic legs somewhat less thick than in the adult, but yet much thicker than in the three other species of the genus.

As seen in the list, five females with marsupium have been captured. The smallest female (from Sta. 4652) is only 30 mm. long, the largest (from Sta. 4724) is 49 mm., the three other respectively 31.6 mm., 34.5 mm. and 36.5 mm. Faxon has mentioned a female measuring 66 mm. in length.

Distribution.— Faxon established *E. sculpticauda* on some specimens from the tropical Pacific (the Galapagos, the Gulf of Panama, off Central America); Ortmann (1905) enumerated two specimens from the Hawaiian Islands. It has been taken by the "Investigator" in the Bay of Bengal, by the Prince of Monaco in various places within the triangular area between Gibraltar, the Azores, and the Canary Islands; finally West of the Hebrides and Southwest of Iceland at Lat. 62° 25′ N., long. 28° 30′ W. (Ingolf-Exp.).

It is interesting that all the specimens captured by the "Albatross" at the six Stations in depths from 300 fms. to surface are not full grown, while one adult female is from 400 fms. to surface and the four other adult females from much greater depths to surface. This seems to confirm my observations

as to *Gnathophausia zoëa* Will.-Suhm, *Sergestes arcticus* Kr., and *Sergestes robustus* Smith, "that small specimens are often at least found nearer the surface than the larger and that the wholly developed specimens are always only met with in deeper layers."

B. Suborder **MYSIDA**.

BOREOMYSIS G. O. Sars (1869).

8. **Boreomysis media,** sp. nov.

Plate 1, figs. 2a–2b.

Sta. 4652. Nov. 11, 1904. Lat. 5° 44.7′ S., long. 82° 39.5′ W. 400 fms. to surface. 1 adult female (Type).
Sta. 4655. Nov. 12, 1904. Lat. 5° 57.5′ S., long. 80° 50′ W. 400 fms. to surface. 1 adult female.
Sta. 4675. Nov. 22, 1904. Lat. 12° 54′ S., long. 78° 33′ W. 300 fms. to surface. 1 adult female.

Description.— Frontal plate very considerably produced (fig. 2a), with the transition between the front margin and the oblique lateral margin considerably curved; the front margin is produced in a conspicuous, triangular, acute rostrum. Eyes of very moderate size, brownish, somewhat depressed, scarcely as broad as the end of the stalk, which is a little broader than long and with a triangular process of moderate size on the upper surface. The antennal squama somewhat short, only three times as long as broad, with the outer margin nearly straight, the inner considerably convex and the end scarcely more than half as broad as the squama a little behind the middle; the terminal margin somewhat oblique and the outer tooth very distinct.

Exopod of uropods (fig. 2b) eight times as long as broad, with a couple of spines placed a little beyond the end of the proximal sixth of the outer margin. Telson scarcely three times as long as broad, because its proximal third is very broad; from the end of that third the telson tapers strongly to the beginning of the distal fourth, where it is narrow, only two fifths as broad as at the base; its terminal fourth widens feebly to the end; the incision, which occupies one fifth or one sixth of the whole length, has no angles on its margins and its proximal part is shaped as a triangle with its two sides a little convex. Each lateral margin from the end of the proximal third to near the distal end is furnished with about 10–11 moderately small spines and 18–20 very small spines, the latter regularly arranged between the former and generally two small spines in each interval (fig. 2b, a); along the distal part of the margin the spines are more equal in size, small.

Length of a female with marsupium (from Sta. 4652) 19.5 mm.

Remarks.— This species is allied to *B. sibogae* H. J. H., but differs especially in having the antennal squama conspicuously broader with the end oblique and the inner margin more convex; furthermore, the telson is distally much narrower and the incision conspicuously shorter than in *B. sibogae*.

9. **Boreomysis fragilis,** sp. nov.

Plate 1, fig. 3a; Plate 2, fig. 1a.

Sta. 4650. Nov. 10, 1904. Lat. 5° 22′ S., long. 84° 39′ W. 300 fms. to surface. 3 specimens.
Sta. 4652. Nov. 11, 1904. Lat. 5° 14.7′ S., long. 82′ 39.5′ W. 400 fms. to surface. 1 specimen.
Sta. 4655. Nov. 12, 1904. Lat. 5° 57.5′ S., long. 80° 50′ W. 400 fms. to surface. 1 adult female.
Sta. 4671. Nov. 20, 1904. Lat. 12° 6.9′ S., long. 78° 28.2′ W. 300 fms. to surface. 1 specimen.
Sta. 4676. Dec. 5, 1004. Lat. 14° 28.9′ S., long. 81° 24′ W. 300 fms. to surface. 1 specimen.
Sta. 4679. Dec. 7, 1904. Lat. 17° 26.4′ S., long. 86° 46.5′ W. 300 fms. to surface. 2 adult specimens, male (Type) and female.

Description.— Frontal plate considerably produced, subtriangular (fig. 3a), with the lateral margins very feebly convex and a little concave in front at the rostral process, which is triangular, acute, and bent a little upwards. Eyes very small, reddish brown, looking forwards and especially downwards, only a narrow strip being visible from above; the eye-stalks increase somewhat in breadth from the base outwards and are somewhat longer, measured from the middle of the terminal margin, than broad; at the upper inner angle produced into an oblong-triangular process reaching considerably beyond the cornea.

The antennal squama is somewhat less than four times as long as broad, broadest somewhat before the middle and there almost twice as broad as at the end; the outer margin is feebly concave, the terminal margin oblique, and the outer tooth very distinct.

Exopod of the uropods (fig. 1a) seven times as long as broad, with a couple of fine spines on the outer margin at the end of its naked basal fifth. Telson proportionately broad, scarcely more than three times as long as broad, but at the beginning of its terminal fourth only about two fifths as broad at a little from the base; the terminal incision, which occupies about one fifth of the total length, has its proximal portion triangular and a little acuminate, while the major part of the lateral margins of the incision are more or less distinctly diverging. The lateral margins of the telson are furnished with a moderately small number of spines; seven or eight at each side are somewhat small but yet considerably or much longer than the others which are very or extremely small.

In the adult male the exopod of third pair of pleopods is about half as long again, the exopod of second pair about one third as long again, as the endopod.

Length of the male 12 mm., of a female with marsupium 13 mm.

Remarks.— This small species is allied to *B. microps* G. O. Sars, but differs especially in having the process at the end of the eye-stalks very much larger and the longer lateral spines on the telson much shorter than in the last-named species. The integuments are thin; not a single specimen is really well preserved, and the majority a good deal mutilated and somewhat shrivelled; most of them are besides immature or small.

It may be mentioned that a small, oblong ganglion is found at the base of the process on the eye-stalks; this ganglion is connected with the large optic ganglion by a couple of nerve fibres, and from it a fibre runs towards the end of the process, which probably may have some sensory function.

SIRIELLA Dana (1850).

Of this very large genus four species are at hand, three of which were taken in 1904–1905, and a fourth in 1900.

10. Siriella thompsonii (H. Milne Edwards).

1837. *Cynthia thompsonii* H. Milne Edwards, Hist. Nat. Crust., **2**, p. 462.
1852. *?Siriella vitrea* Dana, U. S. Expl. Exp. Crust., **1**, p. 656, pl. 43, figs. 6a–6m.
—— *?Siriella brevipes* Dana, U. S. Expl. Exp. Crust., **1**, p. 658, pl. 44, figs. 1a–1q.
1861. *Cynthia inermis* Kröyer, Nat. Tidsskr., 3, R. **1**, p. 44, tab. 2, fig. 6, a–g.
1868. *Siriella edwardsii* Claus, Zeitschr. wiss. Zool., **17**, p. 271, taf. 18.
1882. *Siriellides indica* Czerniavsky, Mon. Mysid., **1**, p. 103, tab. 31, figs. 1–6.
1885. *Siriella thompsoni* G. O. Sars, Challenger Rept., **13**, p. 205, pl. 36, figs. 1–24.
1910. *Siriella thompsonii* H. J. Hansen, Siboga-Exp., **37**, p. 31 (with further notes on synonymy).

Sta. 4571. Oct. 7, 1904. Lat. 33° 40′ N., long. 119° 35′ W. 4 fms., surface net. 2 specimens.
Sta. 4576. Oct. 8, 1904. Lat. 29° 52′ N., long. 116° 56′ W. Surface. 1 specimen.
Sta. 4641. Oct. 18, 1904. Lat. 10° 33′ N., long. 88° 30′ W. Surface. More than 30 specimens
Sta. 4645. Oct. 19, 1904. Lat. 9° 7′ N., long. 85° 11′ W. Surface. 2 specimens.
Sta. 4647. Oct. 20, 1904. Lat. 7° 45′ N., long. 82° 25′ W. Surface. 1 specimen.
Sta. 4649. Oct. 20, 1904. Lat. 7° 15′ N., long. 82° 8′ W. Surface. 2 specimens.
Sta. 4635. Nov. 4, 1904. Lat. 3° 52.5′ N., long. 84° 14.3′ W. Surface. 3 specimens.
Sta. 4640. Nov. 6, 1904. Lat. 0° 39.4′ S., long. 88° 11′ W. Surface. 1 specimen.
Sta. 4646. Nov. 8, 1904. Lat. 4° 1.6′ S., long. 89° 16.3′ W. Surface. 1 specimen.
Sta. 4648. Nov. 9, 1904. Lat. 4° 43′ S., long. 87° 7.5′ W. Surface. 1 specimen.
Sta. 4667. Nov. 18, 1904. Lat. 11° 59.5′ S., long. 83° 40.4′ W. Surface. 1 specimen.
Sta. 4671. Nov. 20, 1904. Lat. 12° 6.9′ S., long. 78° 28.2′ W. Surface. 3 specimens.
Sta. 4677. Dec. 5, 1904. Lat. 14° 37.5′ S., long. 81° 11′ W. Surface. 1 specimen.
Sta. 4678. Dec. 6, 1904. Lat. 16° 31.2′ S., long. 85° 3.8′ W. Surface. 1 specimen.
Sta. 4680. Dec. 7, 1904. Lat. 17° 55′ S., long. 87° 42′ W. Surface. 13 specimens.
Sta. 4682. Dec. 8, 1904. Lat. 19° 7.6′ S., long. 90° 10.6′ W. Surface. 2 specimens.
Sta. 4683. Dec. 9, 1904. Lat. 20° 2.4′ S., long. 91° 52.5′ W. 300 fms. to surface. 1 specimen.
Sta. 4685. Dec. 10, 1904. Lat. 21° 36.2′ S., long. 94° 56′ W. 300 fms. to surface. 2 specimens.
Sta. 4686. Dec. 10, 1904. Lat. 22° 2.2′ S., long. 95° 52′ W. Surface. 2 specimens.
Sta. 4688. Dec. 11, 1904. Lat. 23° 17.2′ S., long. 98° 37.5′ W. Surface. 3 specimens.
Sta. 4692. Dec. 13, 1904. Lat. 25° 40.4′ S., long. 104° 1.3′ W. Surface. 1 specimen.
Sta. 4694. Dec. 22, 1904. Lat. 26° 34′ S., long. 108° 57.3′ W. Surface. 4 specimens.

Sta. 4695.	Dec. 23, 1904.	Lat. 25° 22.4′ S., long. 107° 45′ W. 300 fms. to surface. 2 specimens.
Sta. 4696.	Dec. 23, 1904.	Lat. 24° 10.3′ S., long. 107° 5.3′ W. Surface. 7 specimens.
Sta. 4698.	Dec. 24, 1904.	Lat. 22° 50.1′ S., long. 105° 31.7′ W. Surface. 1 specimen.
Sta. 4700.	Dec. 25, 1904.	Lat. 20° 28.8′ S., long. 103° 26.3′ W. Surface. 5 specimens.
Sta. 4702.	Dec. 26, 1904.	Lat. 18° 39.5′ S., long. 102° W. Surface. 1 specimen.
Sta. 4704.	Dec. 27, 1904.	Lat. 16° 55.3′ S., long. 100° 24.6′ W. Surface. 1 specimen.
Sta. 4706.	Dec. 28, 1904.	Lat. 14° 48.7′ S., long. 98° 15.8′ W. Surface. 1 specimen.
Sta. 4709.	Dec. 30, 1904.	Lat. 10° 15.2′ S., long. 95° 10.8′ W. 300 fms. to surface. 1 specimen.
Sta. 4710.	Dec. 30, 1904.	Lat. 9° 30.5′ S., long. 95° 8.3′ W. Surface. 1 specimen.
Sta. 4712.	Dec. 31, 1904.	Lat. 7° 5′ S., long. 93° 35.5′ W. Surface. 11 specimens.
Sta. 4718.	Jan. 13, 1905.	Lat. 5° 32.4′ S., long. 90° 32.2′ W. Surface. 1 specimen.
Sta. 4720.	Jan. 14, 1905.	Lat. 7° 13.3′ S., long. 102° 31.5′ W. Surface. 1 specimen
Sta. 1723.	Jan. 16, 1905.	Lat. 10° 14.3′ S., long. 107° 45.5′ W. Surface. 11 specimens.
Sta. 4725.	Jan. 17, 1905.	Lat. 11° 38.3′ S., long. 110° 5′ W. Surface. 7 specimens.
Sta. 4727.	Jan. 18, 1905.	Lat. 13° 03′ S., long. 112° 41.9′ W. Surface. 12 specimens.
Sta. 4729.	Jan. 19, 1905.	Lat. 14° 15′ S., long. 115° 13′ W. Surface. 6 specimens.
Sta. 4741.	Feb. 11, 1905.	Lat. 8° 29.7′ S., long. 122° 56′ W. Surface. 1 specimen.

Remarks.— Adult specimens of both sexes vary extremely in length. The smallest female with marsupium (from Sta. 4702) is 4.4 mm. long, another female (from Sta. 4696) scarcely 4.5 mm., while the largest female (from Sta. 4680) is 9.6 mm. from the end of the frontal plate to the tip of the telson. One of the smallest males (from Sta. 4678) is 6.6 mm., and the largest male (from Sta. 4677) is 9.8 mm. The number of spines on the distal part of the outer margin of first joint of the exopod of the uropods varies from 3 to 6.

Three females from Sta. 4727, two from Sta. 4680, and one female from Sta. 4611 and from Sta. 4671, have an Epicarid, probably *Dajus siriellae* G. O. Sars, in the marsupium.

Distribution.— According to the literature and the collections seen by me this species is widely distributed in the tropical and warmer temperate areas of the Atlantic, the Indian Ocean, and the Pacific; the Copenhagen Museum possesses specimens from about fifty places in these Oceans. In the Atlantic it has been taken northwards to Lat. 42° N., long. 44° W., southwards to Lat. 40° 32′ S., long. 52° 2′ W., in the Indian Ocean southwards to Lat. 40° 4′ S., long. 53° 25′ E. (specimens from these three localities in the Copenhagen Museum); in the Pacific it was taken at Lat. 33° 40′ N. in 1904, and southwards it is known from a point between Sidney and Wellington (G. O. Sars). It has generally been captured at the surface; I am even inclined to think that the specimens from the three Stations named above from "300 fms. to surface" were taken near the surface.

11. **Siriella gracilis** Dana.

1852. *Siriella gracilis* Dana, U. S. Expl. Exp. Crust., **1**, p. 658, pl. 44, figs. 1a–1g.
1885. *Siriella gracilis* G. O. Sars, Challenger Rept., **13**, p. 209, pl. 36, figs. 25–28.
1910. *Siriella gracilis* H. J. Hansen, Siboga-Exp., **37**, p. 31.

Sta. 4592. Oct. 13, 1904. Lat. 18° 20′ N., long. 103° 40′ W. Surface. 2 specimens.
Sta. 4607. Oct. 17, 1904. Lat. 12° 00′ N., long. 91° 30′ W. Surface. 1 specimen.
Sta. 4611. Oct. 18. 1904. Lat. 10° 33′ N., long. 88° 30′ W. Surface. 10 specimens.
Sta. 4619. Oct. 20, 1904. Lat. 7° 15′ N., long. 82° 8′ W. Surface. 5 specimens.
Sta. 4640. Nov. 6, 1904. Lat. 0° 39.4′ S., long. 88° 11′ W. Surface. 1 specimen.
Sta. 4712. Dec. 31, 1904. Lat. 7° 5′ S., long. 93° 35.5′ W. Surface. 3 specimens.
Sta. 4716. Jan. 2, 1905. Lat. 2° 18.5′ S., long. 90° 2.6′ W. Surface. 2 specimens.
Sta. 4720. Jan. 14, 1905. Lat. 7° 13.3′ S., long. 102° 31.5′ W. Surface. 11 specimens.
Sta. 4723. Jan. 16, 1905. Lat. 10° 14.3′ S., long. 107° 45.5′ S. Surface. About 30 specimens.
Sta. 4725. Jan. 17, 1905. Lat. 11° 38.3′ S., long. 110° 5′ W. Surface. 8 specimens.
Sta. 4729. Jan. 19, 1905. Lat. 14° 15′ S., long. 115° 13′ W. Surface. 1 specimen.
Sta. 4733. Jan. 21, 1905. Lat. 16° 57.4′ S., long. 120° 48′ W. Surface. 1 specimen.

Besides this species was taken by the "Albatross" in 1899 at a single place: — Hyd. Sta. 3789. Sept. 9, 1899. Lat. 2° 38′ N., long. 137° 22′ W. Surface. 3 specimens. "Albatross."

Distribution.— This slender and small species, which has only been taken at the surface, is known from the Bay of Bengal (the author), is common in the Indian Archipelago ("Siboga"), and from here it is, according to the literature, distributed across the Pacific in its tropical area; Sars has mentioned it from the North Pacific. It has never been taken in the Atlantic.

12. **Siriella media** H. J. Hansen.

1910. *Siriella media* H. J. Hansen, Siboga-Exp., **37**, p. 38, pl. 4, figs. 3a–3k.

Butaritari, Gilbert Islands, Jan. 6, 1900. Lagoon. Surface. Light. 9 specimens (1 adult male, 8 immature specimens). "Albatross."

Remarks.— The presence of an adult male rendered it possible to determine the species. The strong setae of both rami of fourth pair of pleopods agree in every main point and even in most of minute particulars with my drawings (figs. 3e and 3f) in the paper quoted. The proximal joint of each exopod of the uropods with only 13 spines. The male is 9.5 mm. long.

Distribution.— *S. media* was hitherto known only from seven places in the Indian Archipelago ("Siboga").

13. **Siriella aequiremis** H. J. Hansen.

1910. *Siriella aequiremis* H. J. Hansen, Siboga-Exp., **37**, p. 40, pl. 3, figs. 4a–4e; pl. 4, figs. 1a–1l.

Sta. 4592. Oct. 13, 1904. Lat. 18° 20′ N., long. 103° 40′ W. Surface. 1 specimen.
Sta. 4619. Oct. 20, 1904. Lat. 7° 15′ N., long. 82° 8′ W. Surface. 7 specimens.
Hyd. Sta. 3789. Sept. 19, 1899. Lat. 2° 38′ N., long. 137° 22′ W. Surface. 1 adult female.

Remarks.— A couple of specimens are adult males, and the largest is 10.4 mm. The sexual setae on the endopod of fourth pleopods nearly as on fig. 1h in the "Siboga" paper, but the longest inner seta slightly overreaches the terminal, consequently intermediate between fig. 1h and fig. 1f.

Distribution.— *S. acquiremis* was established on specimens from the Indian Archipelago, where it was taken at ten places; furthermore it is known from the Arabian Sea, the Bay of Bengal, the Indian Ocean Lat at. 3° 9′ N., long. 84° 44′ E., and the China Sea (the author).

HEMISIRIELLA H. J. Hansen (1910).

14. **Hemisiriella abbreviata,** sp. nov.

Plate 2, figs. 2a–2c.

Butaritari, Gilbert Islands. Jan. 6, 1900. Lagoon. Surface. Light. 1 female with young. "Albatross."

Description.— Slender.— Carapace extremely short, leaving along the middle line nearly more than three segments uncovered; the frontal plate (fig. 2a) somewhat feebly produced, constituting a low triangle with the vertex acute. Eyes moderately large, very light brownish; the stalks somewhat broader than long and broader than the retina. The antennulae with the third peduncular joint distinctly less than twice as long as broad. The antennal squama short, about two and a half times as long as broad, with the terminal lobe beyond the base of the marginal tooth twice as broad as long.

Uropods (fig. 2b) with the endopod not overreaching the exopod, with five marginal spines occupying only about one fifth of the outer margin of the proximal joint of the exopod, and the distal joint somewhat less than twice as long as broad. Telson (figs. 2b and 2c) proportionately short, not reaching the articulation of the exopod, distinctly less than twice as long as broad, with two pairs of spines at the end of the broad proximal part, while its longer distal part is linguiform, with the proximal third of its lateral margins conspicuously concave and the end broadly rounded; the lateral margins of a little less than the distal half of the telson only with 4–5 spines irregular as to size and intervals, while the terminal margin has three extremely small spines in the interval between three pairs of long spines, the inner pair of which are slightly shorter than the most lateral pair, while the intermediate pair are considerably longer than the others; terminal feathered setae not observed.

Length of the single adult female 5.5 mm.

Remarks.— This species is allied to *H. pulchra* H. J. H., but is smaller with the eyes larger, the third joint of the antennular peduncle shorter in proportion to breadth, and the telson broader with a small number of lateral spines and three pairs of long terminal spines. Though the elongate endopod of the

first pair of legs is lost I refer this species to Hemisiriella, because the preserved second joint of these legs is thicker than that of second pair, because the carapace is extremely short, etc.

ANCHIALINA Norman (1906).

No specimen of this very characteristic genus was taken by Dr. Agassiz in 1904–1905, but three species were secured by the "Albatross" in 1900 at Butaritari, Gilbert Islands, and one of these species is new to science. The genus has been revised in my "Siboga" paper.

15. Anchialina typica (Kröyer).

1861. *Anchialus typicus* Kröyer, Nat. Tidsskr., 3 R., **1**, p. 53, tab. 2, fig. 7, a–l.
1910. *Anchialina typica* H. J. Hansen, Siboga-Exp., **37**, p. 52, pl. 7, figs. 2a–2k.

Butaritari, Gilbert Islands. Jan. 6, 1900. Lagoon. Surface. Light. 7 specimens. "Albatross."

Remarks.— The specimens are all adult males. They are somewhat small, measuring about 5.5 mm. in length, but they agree closely with smaller "Siboga" specimens in all particulars. The exopod of the third pair of pleopods has not four but only three long, slender processes, each with a terminal seta; these processes are found on the fifth, sixth, and seventh joint counted from the distal end, while in the "Siboga" specimen figured (fig. 2i) such processes are found on the fifth to the eighth joint; in small "Siboga" specimens such processes are wanting on the eighth joint or even on the seventh and the eighth joints, as already stated in my paper.

Distribution.— *A. typica* has a very wide distribution, and it may be sufficient to give an abstract of the statements in the "Siboga" paper. The species is known from tropical Atlantic (Kröyer), the West Indies, the Gulf of Siam, several places in the Indian Archipelago, and probably the Hawaiian Islands.

16. Anchialina grossa H. J. Hansen.

1910. *Anchialina grossa* H. J. Hansen, Siboga-Exp., **37**, p. 51, pl. 7, figs. 3a–3n; pl. 8, figs. 1a–1d.

Butaritari, Gilbert Islands. Jan. 6, 1900. Lagoon. Surface. Light. 1 specimen. "Albatross."

Remarks.— The specimen is an immature female. In the shape of the frontal plate with rostrum, the size of the eyes and the shape of the exopod of the uropods it agrees perfectly with females of *A. grossa* from the Indian Archipelago.

Distribution.— *A. grossa* was taken at several places in the Indian Archipelago, and besides it is known from the Gulf of Siam and the Bay of Bengal (the author).

17. **Anchialina obtusifrons,** sp. nov.

Plate 2, figs. 4a–4c.

Butaritari, Gilbert Islands. Jan. 6, 1900. Lagoon. Surface. Light. 2 adult males. "Albatross."

Description.— This species is in most particulars closely allied and similar to *A. grossa*. Frontal plate in the male (fig. 4a) less broad than in *A. grossa* and produced in a long rostrum reaching slightly beyond the eyes; this rostrum has the lateral margins a little concave, these being proximally somewhat converging forward and distally parallel, while the end of the rostrum looks nearly truncate, but its terminal, obtusely triangular portion is in reality bent downwards and backwards below the apparently terminal part. The eyes are brown and slightly larger than in *A. grossa*, broader than the end of the stalk which widens considerably from the base outwards.

Third joint of the antennular peduncle less thick and conspicuously longer than in *A. grossa*, being half as long again as broad. Antennal squama about as in *A. grossa*.

Gnathopods (fig. 4b) nearly as in *A. grossa*; second joint very large and much longer than broad; fifth joint strongly expanded, and from the inner side with a very large, lamellar, oblong-triangular, distally blunt process directed inwards and much forwards; sixth joint broad. First pair of thoracic legs as the following pair, with sixth joint divided into three subjoints.

Exopod of third male pleopods (fig. 4c) in the main as in *A. grossa*, with the distal joints much altered and furnished with several processes which constitute a most complex organ, though different in several minor particulars from that in *A. grossa*. The gigantic lamellar process (a.) on the posterior outer side is much narrowed somewhat before the end and its most distal part is also a little widened; the joint (b.) bearing the terminal processes is much longer than in *A. grossa*, with a terminal, lamellar expansion covering in front the insertion of these processes (c., d., and e.); finally, the inner process (e.) has more than its distal half very slender, the ramification of the median process (d.) is somewhat different from that in *A. grossa*, and the very long outer process (e.) has its secondary branch ($e.^1$) adorned with a few low saw-like teeth.

Uropods with the endopod reaching about the end of the telson and somewhat longer than the exopod, which has the end broadly rounded, nearly truncate, and 15–17 spines along the outer margin.— Telson nearly as in *A. grossa*, but the proximal part of the terminal incision is narrower.

Length 7.5 mm.

Remarks.— As already stated, this species is on the whole allied and similar to *A. grossa*, but the male is easily distinguished by the quite different shape of the rostrum, by having the third antennular joint conspicuously longer in proportion to its breadth, and by the above-mentioned differences in the sexual organ terminating the exopod of third pair of pleopods.

GASTROSACCUS Norman (1869).

The "Albatross" secured several specimens in 1900, but none were found among the material of 1904–1905.

18. Gastrosaccus pacificus, sp. nov.

Plate 2, figs. 3a–3g.

Butaritari, Gilbert Islands. Jan. 6, 1900. Lagoon. Surface. Light. 8 specimens (3 (1 Type) adult males, 5 females with marsupium, 1 immature female). "Albatross."

Description.— Frontal plate, eyes, antennulae, and antennal squama (fig. 3a) nearly as in *G. indicus* H. J. H. (1910).— Male pleopods in the main as in *G. indicus*, but differing in some particulars. First pair (fig. 3b) with the endopod very slender, not one third as long as the exopod, which has the distal third divided into four joints. Second pair (fig. 3c) only a little more than half as long again as the first; the peduncle with second joint almost four times as long as broad; the endopod more than half as long as the exopod, with the distal major part of the proximal half considerably expanded on the outer side and the expansion distally terminating in a sharp, somewhat acute angle, while the distal part of the endopod is slender with a single articulation; the exopod is about as in *G. indicus*. Third pair (fig. 3d) with the endopod not distinguishable; the exopod is extremely elongate, but its distal portion is lost in all the specimens; the most proximal part of the exopod is strongly thickened, twice as long as broad and on the outer side distally produced into a rather short triangular process directed strongly outwards; somewhat beyond that thickened part three small spines are found. Fourth (fig. 3e) and fifth (fig. 3f) pairs nearly as in *G. indicus*; both rami unjointed, the exopod considerably more slender and on fourth pair slightly, on fifth pair considerably, longer than the endopod.

Uropods (fig. 3g) nearly as in *G. indicus*; the exopod with 11 or 12 marginal spines, most of them long, longer than in *G. indicus*. Telson nearly two and a half times as long as broad, with 10–12 spines along each margin, the terminal

spine included; the penultimate pair of spines considerably longer than the terminal pair, twice as long as the antepenultimate pair and nearly as long as the breadth of the telson at their insertion.

Length of both sexes 6.4 mm.

Remarks.— This species is a little smaller than *G. indicus*, but so closely allied that it might be considered a variety if it did not show the very marked difference in the third pair of male pleopods; the rather short, triangular process turning essentially outwards from the thick basal part twice as long as broad seems to be an excellent specific character, as this part differs very much in aspect from the corresponding portion in *G. indicus*, in which the thickened part is much shorter and the process much longer and directed much backwards or parallel with the exopod (Siboga-Exp., Pl. 8, figs. 2k and 2l); unfortunately the distal part of that exopod is wanting. The pedunceles of the three anterior pairs of pleopods are more slender than in *G. indicus*.

All five adult females have a parasitic Isopod in the marsupium, probably a species of Prodajus, and allied to *P. ostendensis* Gilson which inhabits the marsupium of the European *Gastrosaccus spinifer* Goës.

EUCHAETOMERA G. O. Sars (1883).

To this genus Brutomysis Chun and Mastigophthalmus Illig ought to be referred. That Brutomysis must disappear is certain, as its single species, *B. vogtii* Chun, is without doubt a synonym to *E. typica* G. O. S. And Mastigophthalmus does not show any difference from Euchaetomera of real generic value, as the appendix at the eye-stalks is rather developed in *E. typica*, and the spinulation, length of flagella, etc., are only specific characters.

Three species, all captured in 1904–1905, are represented in the collection, and one among them is new.

19. **Euchaetomera typica** G. O. Sars.

Plate 2, figs. 5a–5e.

1883. *Euchaetomera typica* G. O. Sars, Forh. Vid. Selsk. Christiania for 1883, no. 7, p. 42.
1885. *Euchaetomera typica* G. O. Sars, Challenger Rept., **13**, p. 211, pl. 37, figs. 1–20.
1896. *Brutomysis Vogtii* Chun, Bibl. Zool., **7**, heft. 19, p. 179, taf. 15.
1906. ?*Euchaetomera limbata* Illig, Zool. Anz., **30**, p. 203, fig. 10, A–D.

Sta. 4734. Jan. 22, 1905. Lat. 17° 36′ S., long. 122° 35.6′ W. 300 fms. to surface. 2 specimens.

As the two specimens, a female with marsupium and an immature female (together with a third specimen from the Atlantic) differ considerably in a

number of features from the description and figures published by Sars, I asked my friend the excellent carcinologist Dr. W. T. Calman to examine the type preserved in the British Museum. I sent him tracings of my figures published in this paper of my specimen, together with a number of questions on particular features. Dr. Calman answered that the type "agrees better with your description and figures than with those of Sars in all the points you mention," and he added some notes and sketches which agree well with the features observed in my specimens. Therefore I will now give the following additions to the description of Sars.

The front margin of the carapace (fig. 5a) is furnished with spiniform processes or denticles, those on the most lateral fourth of each half of the margin are long and slender, and from here they decrease very much in size, being quite minute along a part of the margin towards the proportionately narrow and very short frontal plate which is produced into a rather slender and somewhat long, acute rostrum. The posterior margin of the carapace has a number of small or very small denticles, while the posterior margin of its lateral wings and the lateral margins are unarmed.

The eyes (fig. 5b) show peculiar features. The postero-lateral area of ocelli is, seen from above, a little more than half as long again as broad; there is no interval between the anterior and the postero-lateral area; the most posterior row of facets of the anterior area is of normal aspect, while each facet in the four following transverse rows of the anterior area is produced into a somewhat small, acute denticle; all other facets on the upper surface of the eye are simple, rounded. From the inner margin of the eye-stalks a little before the ocelli a very oblong, weak process or appendix projects forwards; in the adult female it is about as long as the part with spine-bearing ocelli on the opposite lateral margin.— The antennal squama (fig. 5c) is three times or a little more as long as broad, with the outer margin scarcely concave, the terminal lobe slightly broader than long and the outer distal process as long as, or a little shorter than, the terminal lobe and bent slightly outwards.— The thoracic legs (fig. 5d) on the outer side with a good number of moderately long setae; the distal half or one third of each of these setae is quite naked, while the remainder is very closely plumose; along the inner side of the legs the setae are less numerous, but several among them are very long, and all are naked or with extremely short hairs along the distal side.

First to third abdominal segment without denticles along the margins; fourth segment with very small denticles along the posterior and the lateral

margin, fifth and sixth segments with spiniform denticles along the same margins; most of these denticles are rather large though some small ones are interspersed.— The uropods (fig. 5e) have both rami much slenderer than shown in Sars's fig. 19 (which in this respect differs materially from his fig. 1).— Telson (fig. 5e) considerably broader than long, in the adult female with 6–7 spines along each lateral margin, while in the immature specimen only 4 and 6 spines were observed.

Length of the adult female 9 mm.

Remarks. It will be seen that the additions and corrections to Sars's description and figures are rather numerous. I think that *Brutomysis voglii* Chun, taken at Madeira, is the young male of the same species. The author states that the five anterior abdominal segments have a lateral armature, viz. 4 spiniform denticles at the postero-lateral angle of each segment, while the sixth segment has spines along the whole posterior margin. It is far from improbable that the lateral armature of the anterior abdominal segments is found only in the males, and if this supposition be correct, I think that the other differences between the specimens studied and Chun's description and figures are due to imperfections in the latter.— *E. limbata* Illig is possibly another species, because its squama, according to Illig's figure, has a shape somewhat different from that in *E. typica* and the carapace is, at least in the male, spiniferous around the whole margin.

Distribution.— Sars enumerated three localities in the Northern Pacific between Lat. 35° 22′ and 37° 52′ N., long. 169° 53′ E. and 160° 17′ W.; his specimens were from the surface of the sea. Ortmann recorded it from off Galera Point in the tropical East Pacific and from the Sargasso Sea and the Southern equatorial current in the Atlantic. Dr. J. Schmidt captured a single specimen West of Gibraltar at Lat. 36° 13′ N., long. 9° 44′ W.— Chun's *Brutomysis voglii* was captured at Madeira, and Illig's *E. limbata* at two Stations in the Atlantic.

20. **Euchaetomera tenuis** G. O. Sars.

1883. *Euchaetomera tenuis* G. O. Sars, Forh. Vid. Selsk. Christiania for 1883, no. 7, p. 42
1885. *Euchaetomera tenuis* G. O. Sars, Challenger Rept., **13**, p. 214, pl. 37, figs. 21–24
1905. *Euchaetomera fowleri* Holt & Tattersall, Fisheries Ireland. Sci. Invest., 1902 3, (1905), p. 123 and 144; pl. 24, figs. 1–3.
1910. *Euchaetomera tenuis* H. J. Hansen, Siboga-Exp., **37**, p. 66, pl. 10, fig. 3a.

Sta. 4717. Jan. 13, 1905. Lat. 5° 10′ S., long. 98° 56′ W. 300 fms. to surface. 1 immature female.
Sta. 4719. Jan. 14, 1905. Lat. 6° 29.8′ S., long. 101° 16.8′ W. 300 fms. to surface. 1 adult female.
Sta. 4721. Jan. 15, 1905. Lat. 8° 7.5′ S., long. 104° 10.5′ W. 300 fms. to surface. 1 male.
Sta. 4722. Jan. 16, 1905. Lat. 9° 31′ S., long. 106° 30.5′ W. 300 fms. to surface. 1 adult female.

Remarks.— Illig states (Zool. Anz., 30, 1906, p. 202) that the endopod of first pair of thoracic legs is wanting in *E. fowleri* and in his two new species of Euchaetomera, among which is the above-named *E. limbata*. As to *E. tenuis* Sars = *E. fowleri* Holt and Tatt. his statement is incorrect; the endopod is well developed both in the maxillipeds, the gnathopods, and in all six pairs of real legs; I am inclined to think that the same is the case in his two other species.

Distribution.— Sars's type was captured in the South Pacific off the coast of Chile. The "Siboga" secured it at two places in the Indian Archipelago. According to several authors (Ortmann, Tattersall, Holt and Tattersall, and myself) the species is widely distributed in the tropical and northern temperate Atlantic, in its eastern part going northwards to West of Ireland; and it has been taken in the Western Mediterranean also.

21. **Euchaetomera plebeja,** sp. nov.

Plate 3, figs. 1a–1b.

Sta. 4583. Oct. 11, 1901. Lat. 22° 45′ N., long. 110° 5′ W. 300 fms. to surface. 1 immature specimen.

Sta. 4676. Dec. 5, 1904. Lat. 14° 28.9′ S., long. 81° 24′ W. 300 fms. to surface. 1 male, (Type), perhaps not quite adult.

Description.— Allied to *E. tenuis* G. O. S. and *E. oculata* H. J. H.— The frontal plate (fig. 1a) shaped as a low, broad triangle with the two sides a little concave and the vertex moderately broadly rounded.— The eyes about as thick as in *E. tenuis*, but the posterior area with acting facets is much larger, being longer than broad and the distance between the anterior and the posterior area at the outer margin distinctly less than half as long as the outer margin of the posterior area, while in *E. tenuis* that distance is about as long as the whole outer margin of the posterior area which is shorter than broad.— The antennal squama is five times as long as broad, with the outer margin almost or quite straight, no external tooth and the terminal lobe beyond the most proximal outer seta a little longer than broad.— The rami of the uropods (fig. 1b) broader in proportion to length than in *E. tenuis*.— Telson somewhat broader than long, otherwise as in *E. tenuis*.

Length of the male 5 mm., but the specimen is perhaps not quite full grown.

Remarks.— *E. plebeja* is instantly separated from *E. tenuis* by the much longer posterior dark area of the eyes and by the at least nearly straight outer margin of the antennal squama. *E. oculata* differs from *E. plebeja* by having a very conspicuous, somewhat narrow frontal plate, by considerably thicker eyes and by having the antennal squama only three and a half times as long as broad.

CRYPTOMYSIS, gen. nov.

Description (based on the female).— Body somewhat slender.— Carapace produced into a moderately large, triangular frontal plate (Plate 3, fig. 2a) and posteriorly not covering the entire cephalothorax.

Eyes very large, with short stalks. Antennal squama (fig. 2b) somewhat elongate, lanceolate, narrow, with a transverse suture and setose along both margins.— Labrum obtuse in front, without process.— Left mandible (figs. 2c-2e) has the incisive part well developed, a moderately strong, movable lobe, a couple of thick, digitate setae and the molar process somewhat long and thick; the palp is proportionately slender, its second joint (fig. 2e) somewhat curved, with its inner margin adorned with a row of regularly arranged, spiniform processes, each of which has a seta at the middle of its front margin; third joint of the palp rather short.— Maxillulae (fig. 2f) with the outer joint somewhat slender and a little angular at the middle of its exterior margin.— Maxillae (fig. 2g) somewhat elongate and narrow, with the exopod small and very narrow and the terminal joint not expanded distally and more than twice as long as broad.— Maxillipeds (fig. 2h) with first and second joints very long and moderately slender, first joint terminating in a free, minute lobe and second joint with a small lobe; third, fourth, and fifth joints each not longer than broad and without appreciable lobes; terminal joint small, triangular; claw well developed.

Gnathopods (fig. 2i) with second joint long and thick, without any real lobe; third and fourth joints somewhat small, transverse; fifth and sixth joints rather long, very slender and the fifth nearly naked; the claw somewhat long and strong.— The thoracic legs wanting excepting some exopods and a single endopod; the latter (fig. 2k) is slender, with fourth joint a little shorter than the fifth and a little longer than the sixth, which is divided by a transverse articulation near its end; only a few rather long setae on the endopod.

Uropods (fig. 2l) slender, with both rami setose along both margins as in the subfamily Mysinae; the otocyst well developed.— Telson (figs. 2l and 2m) quite aberrant; it is somewhat short, tapering considerably from the broad base to a little beyond the proximal two thirds of its length and then widening again, the terminal part being much broader than long, with the terminal margin nearly straight at the middle and broadly rounded at the sides; the whole margin of the terminal transverse part of the telson and the distal part of the lateral margins in front of that terminal part furnished with thick spines.

Remarks.— This new genus belongs to the subfamily Mysinae and is easily distinguished from all other genera by the shape of the telson. The male being unknown, I am unable to decide with any certainty whether the genus ought to be referred to the tribe Leptomysini or to the real Mysini. The shape of the antennal squama, of the maxillae and their palp, and the absence of lobes on the third and fourth joints of the maxillipeds seem to indicate relationship to the Leptomysini, while the shape of the telson resembles feebly that in *Anisomysis laticauda* H. J. H., which belongs to the tribe Mysini. The armature of the second joint of the mandibular palps bears a superficial similarity to the structure found in *Lycomysis spinicauda* H. J. H.

22. **Cryptomysis lamellicauda,** sp. nov.

Plate 3, figs. 2a-2m.

Fiji Islands. Off Vatu. Dec. 9, 1897. Plankton, 30 fms. 1 adult female. A. Agassiz.

Description.— Frontal plate (fig. 2a) about twice as broad as long, with the end very acute and distinctly acuminate.— Eyes very large, black.— Antennal squama (fig. 2b) between seven and eight times as long as broad, tapering from the middle, with the narrow end transverse and with the suture from the insertion of the penultimate lateral inner seta to the corresponding incision on the outer margin; the terminal joint not fully twice as long as broad.— Second joint of the mandibular palp (fig. 2e) with about thirteen teeth along the inner margin, those near the middle much longer than the most proximal or the most distal.

Sixth abdominal segment considerably longer than the fifth.— The rami of the uropods slender; the exopod almost seven times as long as broad, and considerably longer than the endopod.— Telson scarcely half as long as the endopod of the uropods, not fully half as long again as broad; the proximal part about as long as broad, with four somewhat strong spines towards the end of each margin; the distal portion a little more than half as broad again as long, with twenty spines, the lateral ones smaller and regularly tapering to the acute end, while the spines along the transverse and nearly straight posterior margin are longer, stronger, and taper only from beyond the middle to the acute end.

Length of the single specimen, a female with marsupium, 5.8 mm.

Remarks.— The specimen is dark coloured, but being far from well preserved and somewhat shrivelled in front it is not impossible that the dark colour may be due to the state of preservation.

DOXOMYSIS, gen. nov.

Description (based on a mutilated adult female).— Body moderately slender.— Carapace anteriorly produced into a rather short, triangular, frontal plate terminating in a rostrum, posteriorly not covering the entire cephalothorax.

Eyes large, with short stalks.— Antennal squama (Plate 3, fig. 3a) scarcely elongate, setose along both margins and with the end very obtuse.— Labrum obtuse in front, without process.— Left mandible (figs. 3b and 3c) with the incisive part, movable lobe, setae, and molar process well developed; the palp about as in the genera allied to Mysis.— The maxillae (fig. 3d) shaped nearly as in Michtheimysis Norm., with the terminal joint of the palp very large, much expanded and broader than long, but the exopod with only a few short setae. Maxillipeds (fig. 3e) with second joint long and terminating in a broad, well-developed, setose lobe; third and fourth joints very broad with broad, setose lobes; fifth and sixth joints broad; seventh joint triangular with its claw shaped as a thick seta.

(Gnathopods wanting).— The endopod of a single thoracic leg was preserved; it is very slender, its fifth joint somewhat longer than the fourth and a little shorter than the sixth; sixth joint divided into three subjoints by two transverse articulations, the first a little before, the second a little beyond the middle.

Uropods slender, both rami-shaped and setose as in the Mysini; the endopod below near the inner margin with a number of spiniform processes directed inwards and downwards.— Telson (figs. 3f and 3g) about half as long as the uropods, distally deeply cleft with minute spines along the margins of the triangular incision; the terminal lobes have the end broad and furnished with some spines.

Remarks.— The shape of the maxillipeds and of the terminal joint of the maxillae seems to prove that the genus belongs to the tribe Mysini, while the telson differs somewhat from that in genera hitherto known.

23. **Doxomysis pelagica**, sp. nov.

Plate 3, figs. 3a–3g.

Sta. 1640. Nov. 6, 1904. Lat. 0° 39.4′ S., long. 88° 11′ W. Surface. 1 mutilated adult female.

Description.— Frontal plate a little more than twice as broad as long, terminating in a slender rostrum unfortunately broken off at some distance from its origin.— Eyes large, but in very damaged condition.— Antennal squama

(fig. 3a) between five and six times as long as broad, with the outer margin a little concave and the inner convex, somewhat tapering from near the base to the broad, almost transverse end; the terminal joint somewhat longer than broad.

The abdominal segments furnished above and on the sides with a very large number of quite minute, mostly very slender denticles.— The exopod of the uropods nearly eleven times as long as broad.— Telson (figs. 3f and 3g) slightly more than half as long as the exopod of the uropods, almost twice as long as broad, with the outer margin somewhat concave; the terminal incision is deep, one third as deep as the length of the telson, oblong-triangular, somewhat rounded at the bottom and there with a couple of setae almost as long as the incision, while each of its lateral margins is furnished with 13–14 very small spines; slightly more than the distal half of each lateral margin of the telson is spiniferous, the proximal spines widely separated from each other, the more distal spines moderately close; the terminal lobes taper somewhat from the base of the incision to near the end, where they are feebly widened inwards; this end is broad and rounded, with four spines distinctly a little longer than the more distal lateral spines.

Remarks.— This species is easily distinguished by the shape and armature of the telson. The presence of a very large number of tiny denticles on the abdominal segments is interesting.

II. The Order EUPHAUSIACEA.

The collection contains representatives of eight genera. Only three genera hitherto known are wanting, viz. Meganyctiphanes Holt and Tatt., Thysanoëssa Kröyer (with Rhoda Sim or Boreophausia G. O. S.[1]), and Tessarabrachion H. J. H., but these are exclusively confined to the temperate and cold seas.

BENTHEUPHAUSIA G. O. Sars (1885).

Only a single species is known.

1. Bentheuphausia amblyops (G. O. Sars).

1883. *Thysanopoda (?) amblyops* G. O. Sars, Forh. Vid. Selsk. Christiania for 1883, no. 7, p. 23.
1885. *Bentheuphausia amblyops* G. O. Sars, Challenger Rept., **13**, p. 109, pl. 19; text-fig. 4.

[1] This topic has been dealt with in my paper on the genera and species of the order Euphausiacea (Bull. Mus. Océan. Monaco, no. 240, 1911).

Sta. 4676.	Dec. 5, 1904.	Lat. 14° 28.9′ S., long. 81° 21′ W.	300 fms. to surface.	1 specimen.
Sta. 4679.	Dec. 7, 1904.	Lat. 17° 26.4′ S., long. 86° 46.5′ W.	300 fms. to surface.	1 specimen.
Sta. 4681.	Dec. 8, 1904.	Lat. 18° 47.1′ S., long. 89° 26′ W.	300 fms. to surface.	2 specimens.
Sta. 4683.	Dec. 9, 1904.	Lat. 20° 2 4′ S., long. 91° 52.5′ W.	300 fms. to surface.	2 specimens.
Sta. 4707.	Dec. 29, 1904.	Lat. 12° 33.2′ S., long. 97° 42′ W.	300 fms. to surface.	1 specimen.
Sta. 4722.	Jan. 16, 1905.	Lat. 9° 31′ S., long. 106° 30.5′ W.	300 fms. to surface.	1 specimen.
Sta. 4740.	Feb. 11, 1905.	Lat. 9° 2.4′ S., long. 123° 20.1′ W.	300 fms. to surface.	3 specimens.

Distribution.— According to the literature this species is known from the Atlantic, where it extends northwards to Lat. 46° 15′ N. and southwards to a place off Tristan da Cunha; also from the Bay of Bengal, the Indian Archipelago, and South of Australia.

It is a true bathypelagic species and this explains perhaps that among the twelve specimens from seven Stations in the East Pacific only a single specimen (from Sta. 4707) seems to be really adult.

THYSANOPODA H. Milne Edwards (1830).

The material of this large and somewhat difficult genus is very rich, comprising nine species; a young specimen, which is very far from adult though not small, I have with some doubt referred to *T. cornuta* Illig, of which a much larger specimen is at hand. Only two valid species of this genus are not found in the collection, but both are known only from the North Atlantic.[1]

The maxillulae differ much from each other in various species, affording excellent specific characters, especially characters for quite small groups of species. In a couple of species the outer lamella from their first lobe, the "pseudexopod," is somewhat small, at most slightly overreaching the outer margin of third joint, while in most species the pseudexopod is of moderate size or very large, with its greater part reaching beyond the outer margin of third joint; furthermore the fourth joint, the palp, differs extremely as to length and breadth in various species. For these reasons I have given figures of the maxillulae of most species.— The maxillae of various species differ generally but little in shape, and therefore it has been deemed unnecessary to figure more than the maxilla of a single species.

Group a. *Carapace without any distinct cervical groove. Maxillulae with the pseudexopod from moderately large to very large, with at least almost their half situated beyond the outer margin of third joint, and with the palp at most moderately long and somewhat overreaching the third joint. Sixth abdominal segment longer than the fifth.*

[1] *Thysanopoda megalops* Illig as re-established by that author in July, 1911, on a specimen from the Indian Ocean is certainly a young and most probably the young of *T. egregia* H. J. H.

a. Carapace in the adults with a denticle on or near the lower margins near their posterior end.

2. **Thysanopoda tricuspidata** H. Milne Edwards.

Plate 4, fig. 2a.

1830. *Thysanopode tricuspide* H. Milne Edwards, Ann. Sc. Nat., **19**, p. 454, pl. 19.
1837. *Thysanopoda tricuspidata* H. Milne Edwards, Hist. Nat. Crust., **2**, p. 466, pl. 26, figs. 1–6.
1885. *Thysanopoda tricuspidata* G. O. Sars, Challenger Rept., **13**, p. 98, pl. 17, p. 165, pl. 31, figs. 1–22 (larval stages).
1910. *Thysanopoda tricuspidata* H. J. Hansen, Siboga-Exp., **37**, p. 82, pl. 12, figs. 3a–3b.

Sta. 4705. Dec. 28, 1904. Lat. 15° 5.3′ S., long. 99° 19′ W. 300 fms. to surface. 1 specimen.
Sta. 4721. Jan. 15, 1905. Lat. 8° 7.5′ S., long. 104° 10.5′ W. 300 fms. to surface. 2 specimens.
Sta. 4725. Jan. 17, 1905. Lat. 11° 38.3′ S., long. 110° 5′ W. Surface. 3 older larvae.
Sta. 4728. Jan. 19, 1905. Lat. 13° 47.5′ S., long. 114° 21.6′ W. 300 fms. to surface. 6 specimens.
Sta. 4729. Jan. 19, 1905. Lat. 14° 15′ S., long. 115° 13′ W. Surface. 1 very young specimen.
Sta. 4730. Jan. 20, 1905. Lat. 15° 7′ S., long. 117° 1.2′ W. 300 fms. to surface. 1 specimen.
Sta. 4734. Jan. 22, 1905. Lat. 17° 36′ S., long. 122° 35.6′ W. 300 fms. to surface. 2 specimens.
Sta. 4740. Feb. 11, 1905. Lat. 9° 2.1′ S., long. 123° 20.1′ W. 300 fms. to surface. 1 specimen.

To the description given by Sars and that in the "Siboga" Report some remarks on the maxillulae may be added for comparison with the same organs in the following forms. The lobe of first lobe, the proximal lobe (fig. 2a, l^1.) is somewhat broad, with the end nearly regularly rounded; the lobe from third joint (l^3.) is moderately broad, not widened towards the end, about as broad as the terminal part of the proximal lobe and considerably narrower than in the following species; the fourth joint (4.), the palp, is comparatively large, somewhat longer than the lobe of third joint, widening much from the base to beyond the middle, more than half as broad as long, with the end almost cut obliquely, setose both along the long and the little convex terminal margin, and on the outer margin. The pseudexopod (px) is only moderately large, not larger than the inner distal, transverse portion of the proximal lobe, very oblong, with about its half situated outside the outer margin of the third joint and covering only a very small part of the fourth joint.

Distribution.— According to the literature (Sars, Ortmann, Hansen) and to the material at hand this characteristic species is common in the tropical Atlantic, ranging northwards to the Sargasso Sea (Ortmann); it occurs also in the Indian Archipelago and adjacent areas, and it has been taken at various places in the tropical Pacific and even more to the southwards in that Ocean (Sars). The Copenhagen Museum possesses specimens from more than thirty localities, the majority from the Atlantic between Lat. 28° 12′ N. and 22° S., but eight among the Stations from the seas around Southeastern Asia, f. inst, Lat. 13° S., long. 103° 20′ E.; Lat. 16° 8′ S., long. 111° 50′ E.; Lat. 16° N.,

long. 115° 20′ E. Probably all the specimens in the Copenhagen Museum were taken at the surface of the sea during night.

3. **Thysanopoda cristata** G. O. Sars.

Plate 3, figs. 4a–4c; Plate 4, figs. 1a–1h.

1883. *Thysanopoda cristata* G. O. Sars, Forh. Vid. Selsk. Christiania for 1883, no. 7, p. 22.
1885. *Thysanopoda cristata*, G. O. Sars, Challenger Rept., **13**, p. 101, pl. 18, figs. 15–20.
1893. *Thysanopoda biproducta* Ortmann, Ergebn. der Plankton-Exped., **2**, G. b. p. 8, taf. I, fig. 1.

Sta. 4699. Dec. 25, 1904. Lat. 21° 39.5′ S., long. 104° 29.8′ W. 300 fms. to surface. 1 young specimen.
Sta. 4728. Jan. 19, 1905. Lat. 13° 47.5′ S., long. 114° 21.6′ W. 300 fms. to surface. 1 adult male.
Sta. 4736. Jan. 23, 1905. Lat. 19° 0.4′ S., long. 125° 5.4′ W. 300 fms. to surface. 1 immature specimen.

Description.— The frontal plate (Plate 3, fig. 4b) long, only a little broader than long with the lateral margins considerably concave, strongly tapering forwards and narrow in front, where it terminates in a moderately short, slender rostrum which at its base is distinctly narrower than the end of the plate; in the adult specimen (and in Sars's type) the rostrum seems to be articulated to the end of the plate, but whether this is the normal state or is due to injury I cannot decide. In the two much smaller specimens the rostrum is broader at the base and not well-marked off. At the anterior end of the frontal plate a very conspicuous, somewhat high, sharp dorsal keel is suddenly raised (Plate 3, figs. 4a and 4c), the front end of which is even emarginate and terminates above in a point; the keel goes backwards to near the middle of the carapace, and about at the middle of its length, where the dorsal organ is found, it is rather suddenly somewhat higher, while it is rounded downwards towards its posterior end; in the smallest specimen the keel has no angle or incision at its front end, and its anterior half decreases in height towards the rostrum where it disappears. The carapace has no cervical suture, but two oblique, moderately short impressions on each side at a distance from the front lateral margin of about one third of the length of the carapace; the upper of these impressions is nearly horizontal, the lower very oblique and below limited by a low narrow ridge. The lateral part of the front margin of the carapace below the eye is produced in a triangular, acute, somewhat small plate; at a considerable distance from the lower margin a deep furrow is seen, beginning above the insertion of the maxilla and reaching to near the hind margin of the carapace, where it bends upwards and terminates at the middle of the side. A small tooth (omitted in fig. 4a by the engraver) is found above the lateral margin — in the small specimen on the margin — of the carapace somewhat before its posterior end; the tooth is acute, directed outwards, forwards, and downwards.

The eyes are of moderate size, with the eye-stalks short.— The antennular peduncles are somewhat short and in adults very thick (Plate 4, figs. 1a and 1b); in a little more than half-grown specimen much more slender (fig. 1c). Seen from the side (fig. 1a) the distal upper part of the first joint is raised as a high and thick, vaulted, setose roof above the insertion of the second joint; seen from above (fig. 1b) the same distal part is produced forwards as a short triangle with the inner angle acute, but without any process or armature; on the outer margin of the joint a somewhat small, oblong process is seen. The second joint in the adult has, seen from the side (fig. 1a), its distal half considerably vaulted above; seen from above (fig. 1b) its breadth is as long as its inner margin, while distally and a little nearer the outer than the inner margin it is produced forwards in a triangular, acute lobe considerably broader than long and with its end pointing outwards and especially forwards. Third joint in the adult with the distal part of the upper margin considerably arched, rounded, but the dorsal crest is not well defined. In considerably smaller specimens the vaulting of the distal parts of the joints is much less developed (fig. 1c).— The antennal squama reaches the middle of third antennular joint and has a distinct triangular tooth at the outer distal angle; the spiniform process from the outer end of the peduncle is scarcely one fourth as long as the squama.

The maxillulae (Plate 4, fig. 1d) are in the main intermediate between those in *T. tricuspidata* and in the following forms. The proximal lobe is considerably smaller than in *T. tricuspidata* and somewhat angular at the inner distal end; the distal lobe is much broader than the proximal, a little widened towards the terminal margin which is slightly convex; the palp is somewhat longer than the distal lobe, narrow, between three and four times as long as broad and tapering beyond the middle. The pseudexopod is a little broader and distinctly longer than in *T. tricuspidata*, but not reaching much beyond the proximal angle of the insertion of the palp.

The lateral plates of the five anterior abdominal segments are broad and deep; those of second to fourth segments with the lower margin a little irregularly emarginate; fourth and fifth segments each with a dorsal spiniform denticle; sixth segment uncommonly short and deep. The inner ramus of the uropods conspicuously shorter than the outer which reaches a little beyond the tip of the telson.— Telson has in Sars's type seven pairs of dorsal spines (it is mutilated in my adult specimen).

The copulatory organs (Plate 4, figs. 1e–1h) show some peculiarities. The spine-shaped process (p^1.) is moderately curved. The terminal process (p^2.)

is medium sized, seen from behind (fig. 1f) considerably curved at the middle, with the convex margin outwards and with the end compressed; seen from the inner side (fig. 1g) the proximal half is besides a little curved, while a somewhat short terminal part of the distal half is a little widened, very oblong, subacute and bent to the left. The proximal process (p^3.) overreaches considerably the terminal; it is proportionately not thick at the base and tapers gradually towards the other obtuse end; its distal third is very slender; it is curved somewhat inwards at the end of its proximal fourth, while its distal half constitutes a portion of a circle with the convex margin inwards. The median lobe (lm.) is long and about its distal fourth is nearly lamellar; this lobe is produced distally with the tip rounded, and the lamellar part is bent inwards, covering, seen from behind, the distal part of the lateral process. This process (p^4.) is very long, a little curved to the beginning of its terminal fifth, which is much curved inwards and especially forwards and in reality considerably longer than seen on the figures (figs. 1e and 1h) as these do not exhibit the process from the inner side. The additional process (fig. 1h, which shows both the lateral and the additional process seen from in front) is situated at the base of the lamellar part mentioned; it is short, somewhat oblong, very thick to near the end which is acuminate, acute, and somewhat curved. The auxiliary lobe (lu.) is somewhat short. The setiferous lobe (ls.) is nearly lanceolate with the end rounded and with setae along both margins to their base.

Length of the adult male 38 mm., of the two other specimens respectively 23 mm. and 18 mm. Sars's type measures 48 mm. in length.

Remarks.— In 1907 I compared the largest specimen in the Agassiz collection directly with Sars's type in the British Museum and found that they agree perfectly with each other. Consequently Sars's figs. 15–16 are inaccurate in various particulars of the carapace and the antennular peduncles. Sars figured the rostrum bent downwards, but this is quite accidental, as the rostrum is articulated to the frontal plate or broken at the base (see above). Furthermore his fig. 15 exhibits a cervical groove and other furrows on the anterior half of the carapace, but they do not exist, while he did not draw the two short lateral impressions really existing and shown in my figures. He figured the dorsal keel a little higher than in his specimen, and he overlooked the denticle above the lateral margin somewhat from its posterior end. The antennular peduncles are not well drawn in his figures. Finally, his statement on the length of his specimen (he states it to be 55 mm.) indicates that he here, and probably elsewhere in his work, measured the animal from the end of the

antennal squama instead of from the tip of the rostrum.— Ortmann's description is incomplete and his figure not very good, but I have no doubt that he examined a young specimen of this species.

It may be added that the postero-lateral denticle on the carapace changes its place. In the smallest specimen it protrudes from the lateral margin itself, in the somewhat larger specimen a little above that margin, and in the adult male still a little higher, but yet slightly nearer to the lower margin than to the longitudinal furrow.

Distribution. This species has a very extensive distribution but seems to be rare, only two specimens being mentioned in the literature. The type of Sars was taken at Lat. 5° 47′ N., long. 124° 1′ E., South of Mindanao, Philippine Islands; Ortmann's specimen was captured in the Sargasso Sea, North Atlantic. For various reasons I think that adult specimens generally live in very considerable depths.

4. **Thysanopoda monacantha** Ortmann.

Plate 4, figs. 3a–3e.

1893. *Thysanopoda monocantha* Ortmann, Ergebn. du Plankton-Exped., **2**, G. b. p. 9, taf. 1, fig. 2.
1894. *Thysanopoda agassizii* Ortmann, Bull. Mus. Comp. Zool., **25**, p. 99, plate, figs. 1–2.
1905. *Thysanopoda lateralis* H. J. Hansen, Bull. Mus. Océan. Monaco, no. 30, p. 18.
1908. *Thysanopoda ctenophora* Illig, Zool. Anz., **23**, p. 112.
1910. *Thysanopoda agassizii* H. J. Hansen, Siboga-Exp., **37**, p. 87, pl. 13, figs. 3a–3g.

Sta. 4634. Nov. 4, 1904. Lat. 4° 35.4′ N., long. 83° 32.3′ W. 300 fms. to surface. 1 very young specimen.
Sta. 4663. Nov. 16, 1904. Lat. 11° 20.3′ S., long. 88° 55.2′ W. 300 fms. to surface. 1 specimen.
Sta. 4679. Dec. 7, 1904. Lat. 17° 26.4′ S., long. 86° 46.5′ W. 300 fms. to surface. 18 specimens.
Sta. 4681. Dec. 8, 1904. Lat. 18° 47.1′ S., long. 89° 26′ W. 300 fms. to surface. 17 specimens.
Sta. 4683. Dec. 9, 1904. Lat. 20° 2.4′ S., long. 91° 52.5′ W. 300 fms. to surface. 8 specimens.
Sta. 4685. Dec. 10, 1904. Lat. 21° 36.2′ S., long. 94° 56′ W. 300 fms. to surface. 1 specimen.
Sta. 4701. Dec. 26, 1904. Lat. 19° 11.5′ S., long. 102° 24′ W. 300 fms. to surface. 1 specimen.
Sta. 4705. Dec. 28, 1904. Lat. 15° 5.3′ S., long. 99° 19′ W. 300 fms. to surface. 16 specimens.
Sta. 4707. Dec. 29, 1904. Lat. 12° 33.2′ S., long. 97° 42′ W. 300 fms. to surface. 1 specimen.
Sta. 4709. Dec. 30, 1904. Lat. 10° 15.2′ S., long. 95° 40.8′ W. 300 fms to surface. 13 specimens.
Sta. 4711. Dec. 31, 1904. Lat. 7° 47.5′ S., long. 94° 5.5′ W. 300 fms. to surface. 2 specimens.
Sta. 4719. Jan. 14, 1905. Lat. 6° 29.8′ S., long. 101° 16.8′ W. 300 fms. to surface. 3 specimens.
Sta. 4721. Jan. 15, 1905. Lat. 8° 7.5′ S., long. 104° 10.5′ W. 300 fms. to surface. 2 specimens.
Sta. 4722. Jan. 16, 1905. Lat. 9° 31′ S., long. 106° 30.5′ W. 300 fms. to surface. 7 specimens. (1 very small).
Sta. 4724. Jan. 17, 1905. Lat. 11° 13.4′ S., long. 109° 39′ W. 300 fms. to surface. 1 small specimen.
Sta. 4728. Jan. 19, 1905. Lat. 13° 47.5′ S., long. 114° 21.6′ W. 300 fms. to surface. 3 specimens, very small.
Sta. 4730. Jan. 20, 1905. Lat. 15° 7′ S., long. 117° 1.2′ W. 300 fms. to surface. 1 specimen.
Sta. 4740. Feb. 11, 1905. Lat. 9° 2.1′ S., long. 123° 20.1′ W. 300 fms. to surface. 1 specimen.

Remarks.— Both subadult specimens, very young specimens, and older larvae have been described and figured in the "Siboga" paper quoted. Here a few remarks are sufficient.

The maxillulae (fig. 3a) are still more developed in the directions already indicated in *T. cristata*. The proximal lobe (l^1.) is a little larger than in that species; the distal lobe (l^3.) expands considerably in breadth from the insertion of the palp to the very broad end, the margin of which is feebly convex with the angles rounded, and the lobe is more than half as broad again as the proximal and considerably broader than long, the length measured to the distal part of the insertion of the palp. The palp (4.) is rather short, not reaching the end of the distal lobe, slender and tapering to the transversely cut end. The pseudexopod (px.) is extremely large, twice as long as broad and reaches even a little beyond the end of the distal lobe.

Ortmann has seen a specimen 32 mm. long. The largest specimen in the Agassiz collection is a female measuring 27 mm., but among the males, measuring about 22–24 mm., not a single specimen seems to be adult, as may be judged from the stage of development of the lobes and especially of the processes of the copulatory organs. Fig. 3b and fig. 3c exhibit the two lobes of two males; the spine-shaped process is, as usual in immature specimens, well developed, but the terminal and the lateral processes are simple and slender conical, and the proximal process is nearly similar, yet a little or somewhat curved at the middle. The additional process on fig. 3b is also slender conical, while fig. 3c exhibits a most interesting feature, viz. three additional processes (p^5.) of the same undeveloped character. I suppose that the existence of three additional processes is a casual anomaly, but the question ought to be studied by a future investigator who has a number of adult males at his disposal.

Distribution.— This species was established on a specimen taken in the Guinea current in the tropical Atlantic; the Monaco specimen described as *T. lateralis* is from Lat. 27° 43′ N., long. 18° 28′ W.; *T. ctenophora* Illig from the Gulf of Guinea. *T. agassizii* Ortm. which, according to my opinion, cannot be separated from *T. monacantha*, was described from specimens taken in the Gulf of Panama and between the Galapagos and Acapulco; a specimen was captured in the waters of the Hawaiian Islands (Ortmann) and several specimens were secured by the "Siboga" in the Indian Archipelago. In the area explored in 1904–1905 the species was not taken in the two most southern districts or in a broad belt along the coast of South America. I suppose that adult specimens live in considerable depths, at least generally in more than 300 fms. from the surface.

5. **Thysanopoda aequalis** H. J. Hansen.

Plate 4, fig. 4a.

1905. *Thysanopoda aequalis* H. J. Hansen, Bull. Mus. Océan Mon., no. 42, p. 19.
1910. *Thysanopoda aequalis* H. J. Hansen, Siboga-Exp., **37**, p. 84, pl. 12, figs. 4a–4c; pl. 13, fig. 1a.

Sta. 4681.	Dec. 8, 1904.	Lat. 18° 47.1′ S., long. 89° 26′ W.	300 fms. to surface. 1 specimen.
Sta. 4683.	Dec. 9, 1904.	Lat. 20° 2.4′ S., long. 91° 52.5′ W.	300 fms. to surface. 9 specimens.
Sta. 4685.	Dec. 10, 1904.	Lat. 21° 36.2′ S., long. 94° 56′ W.	300 fms. to surface. 3 specimens.
Sta. 4687.	Dec. 11, 1904.	Lat. 22° 49.5′ S., long. 97° 30.6′ W.	300 fms. to surface. 8 specimens. 2125 fms. to surface. 5 specimens.
Sta. 4689.	Dec. 12, 1904.	Lat. 24° 5′ S., long. 100° 20′ W.	300 fms. to surface. 1 specimen.
Sta. 4691.	Dec. 13, 1904.	Lat. 25° 27.3′ S., long. 103° 29.3′ W.	300 fms. to surface. 9 specimens.
Sta. 4695.	Dec. 23, 1904.	Lat. 25° 22.4′ S., long. 107° 45′ W.	300 fms. to surface. 1 specimen.
Sta. 4701.	Dec. 26, 1904.	Lat. 19° 11.5′ S., long. 102° 24′ W.	300 fms. to surface. 10 specimens.
Sta. 4703.	Dec. 27, 1904.	Lat. 17° 18.6′ S., long. 100° 52.3′ W.	300 fms. to surface. 3 specimens.
Sta. 4705.	Dec. 28, 1904.	Lat. 15° 5.3′ S., long. 99° 19′ W.	300 fms. to surface. 20 specimens.
Sta. 4722.	Jan. 16, 1905.	Lat. 9° 31′ S., long. 106° 30.5′ W.	300 fms. to surface. 2 specimens.
Sta. 4724.	Jan. 17, 1905.	Lat. 11° 13.4′ S., long. 109° 39′ W.	300 fms. to surface. 4 specimens.
Sta. 4728.	Jan. 19, 1905.	Lat. 13° 47.5′ S., long. 114° 21.6′ W.	300 fms. to surface. 4 specimens.
Sta. 4730.	Jan. 20, 1905.	Lat. 15° 7′ S., long. 117° 1.2′ W.	300 fms. to surface. 11 specimens.
Sta. 4732.	Jan. 21, 1905	Lat. 16° 32.5′ S., long. 119° 59′ W.	300 fms. to surface. 10 specimens.
Sta. 4740.	Feb. 11, 1905.	Lat. 9° 2.1′ S., long. 123° 20.1′ W.	300 fms. to surface. 1 specimen.

Remarks.— To my earlier descriptions of this characteristic species some notes on the maxillulae (fig. 4a) may be added. They differ in some features from those in *T. monacantha*. The proximal lobe is medium sized, with the terminal, somewhat convex margin rather oblique; the distal lobe expands somewhat towards the feebly convex terminal margin, is somewhat broader than long and more than half as broad again as the proximal; the palp is very oblong-oval with the end very obtuse, besides nearly two and a half times as long as broad and reaches the end of the distal lobe. The pseudexopod is large, yet a good deal smaller than in *T. monacantha*, twice as long as broad and reaches considerably beyond the insertion of the palp.

Length of one of the largest specimens, an adult male, 17.5 mm.

Young Specimens.— Specimens measuring 6.5–8 mm. differ in two important particulars from subadults and adults. The frontal plate is proportionately larger, flatter, and the rostrum is a minute, quite horizontal denticle. The eyes are much higher than broad, with the upper half yellowish or light brownish and marked off from the distinctly or much darker lower half. The lobe from the first antennular joint has not acquired its full size, but its shape shows that the specimens belong to this species.— Specimens measuring about 10 mm. are intermediate between the adults and the young as to the organs mentioned.

Distribution.— The species is common in the eastern part of the Atlantic from Lat. 36° 17′ N. to Lat. 28° N. (Monaco collection), and it has been taken in the Mediterranean (Tattersall). The Copenhagen Museum possesses speci-

mens from four localities in the Eastern Atlantic between Lat. 28° N. and Lat. 23° N., besides from the Central Atlantic at Lat. 5° 7′ 15′ N., long. 30° W., from Southern Atlantic at Lat. 30½° S., long. 22½° W., finally from five Stations in an area across the more southeastern part of the Indian Ocean, viz. between Lat. 22½° S. and 27½° S., long. 80° E. and 103° E. From the Hawaiian waters (the label has Sta. 3808. From between Erben Bank to Kaiwi Channel) I have seen nine specimens belonging to this species but referred by Ortmann (1905) to *T. obtusifrons* G. O. S. In the area explored in 1904–1905 this species is confined to the southern part, not going North of Lat. 9½° S. — The specimens in the Copenhagen Museum have certainly all been taken at the surface during night.

6. **Thysanopoda obtusifrons** G. O. Sars.

Plate 4, figs. 5a–5f.

1883. *Thysanopoda obtusifrons* G. O. Sars, Forh. Vid. Selsk. Christiania for 1883, no. 7, p. 21.
1885. *Thysanopoda obtusifrons* G. O. Sars, Challenger Rept., **13,** p. 102, pl. 12, figs. 1–14.
1905. *Thysanopoda vulgaris* H. J. Hansen, Bull. Mus. Océan. Monaco, no. 30, p. 15.
1905. *Thysanopoda vulgaris* H. J. Hansen, Bull. Mus. Océan. Monaco, no. 42, p. 20.
1910. *Thysanopoda obtusifrons* H. J. Hansen, Siboga-Exp., **37,** p. 81.

Sta. 4683.	Dec. 9, 1904.	Lat. 20° 2.4′ S., long. 91° 52.5′ W.	300 fms. to surface. 7 specimens.
Sta. 4685.	Dec. 10, 1904.	Lat. 21° 36.2′ S., long. 94° 56′ W.	300 fms. to surface. 11 specimens.
Sta. 4687.	Dec. 11, 1904.	Lat. 22° 49.5′ S., long. 97° 30.6′ W.	300 fms. to surface. 6 specimens. 2125 fms. to surface. 3 specimens.
Sta. 4689.	Dec. 12, 1904.	Lat. 24° 5′ S., long. 100° 20′ W.	300 fms. to surface. 2 specimens.
Sta. 4691.	Dec. 13, 1904.	Lat. 25° 27.3′ S., long. 103° 29.3′ W.	300 fms. to surface. 4 specimens.
Sta. 4695.	Dec. 23, 1904.	Lat. 25° 22.4′ S., long. 107° 45′ W.	300 fms. to surface. 2 specimens.
Sta. 4701.	Dec. 26, 1904.	Lat. 19° 11.5′ S., long. 102° 24′ W.	300 fms. to surface. 2 specimens.
Sta. 4730.	Jan. 20, 1905.	Lat. 15° 7′ S., long. 117° 1.2′ W.	300 fms. to surface. 1 specimen.
Sta. 4732.	Jan. 21, 1905.	Lat. 16° 32.5′ S., long. 119° 59′ W.	300 fms. to surface. 2 specimens.
Sta. 4740.	Feb. 11, 1905.	Lat. 9° 2.1′ S., long. 123° 20′ W.	300 fms. to surface. 4 specimen.

Description.— The frontal plate (figs. 5a–5b) is considerably produced, about twice as broad as long, broadly obtuse, with the front margin rounded or a little angular at the middle and somewhat shorter than one of its oblique lateral margins; on its end is seen the rostrum transformed as a small, vertical, conical tooth or at least a vestige of such a tooth; the plate is thick, longitudinally concave at the middle, so that a pair of submedian obtuse keels, united in front at the rostrum mentioned, is formed, and a little behind the rostrum begins a rather low median keel which is highest considerably behind the end of the submedian keels and occupies about two fifths of the length of the carapace. The carapace has a minute, but distinct, denticle on the outer side of the lateral margin somewhat before its posterior end, while the produced part of the anterior margin above the antennae is only a minute tooth; a furrow runs close to the lateral margin along its entire length and bends upwards along a portion of the posterior margin, but the carapace has no other grooves.

The eyes are somewhat small, dark brownish or nearly black.— The antennulae have the first joint of the peduncle short and very broad, with a moderately short, spiniform process from the distal outer angle; above the joint is distally strongly raised as an obliquely transverse, vaulted part, from which a subquadrangular lobe projects forwards, closely covering not quite the inner half of the proximal part of second joint; this lobe is moderately thick, with the outer margin nearly straight or a little convex, the distal margin not longer than the base and the outer distal angle either simple or produced in a small tooth; the upper surface of the lobe is set with somewhat short, stiff setae. The second antennular joint is produced anteriorly above into a kind of short, broad, distally rounded lobe, the front margin of which begins at a point somewhat removed from the outer angle of the joint and goes inwards and considerably forwards to the inner margin of third joint. Third joint with the dorsal keel well defined, but low.— The antennal squama reaches at least to the distal end of second antennular joint; it is broad, with the end nearly truncate and without any outer distal tooth. The spiniform process from the peduncle about one third as long as the squama (fig. 5b).— The maxillulae (fig. 5c) essentially as in *T. aequalis*, but the proximal lobe has the end nearly obliquely cut off, the distal lobe is considerable widened towards the end and much broader than long; the palp is slender, about four times as long as broad, reaching the end of the distal lobe; the pseudexopod is extremely large, twice as long as broad and reaches about the end of the palp.

The abdominal segments are without any dorsal denticle; the side-plates of second to fourth segment with the lower margin a little emarginate. The preanal spine middle sized, simple, curved, and acute.— The uropods about as long as the telson, with the endopod a little shorter than the exopod.— The telson with six or seven pairs of dorsal saw-teeth.

The copulatory organs (figs. 5d–5f) show several distinguishing features. The spine-shaped process (p^1.) is well developed, placed at the inner margin of the inner lobe not far from its end. The terminal process (p^2.) of moderate length and thickness, slightly curved, seen from behind (fig. 5d) with the distal third tapering to the obtuse end; seen from the inner side (fig. 5e) the distal part is compressed with the outer margin somewhat serrate, the other margin somewhat convex. The proximal process (p^3.) with the basal portion very thick and directed much outwards; then it bends abruptly forwards and at the bend a kind of heel-shaped process is directed outwards; the major distal part is, seen from behind (fig. 5d), feebly curved, seen from the inner side (figs. 5e and 5f) considerably curved beyond the middle and somewhat expanded but tapering

again to the end, which is truncate and at the posterior margin produced into a tooth. The median lobe has the basal part somewhat broad, and the lateral process (p^4.) is inserted a little before its middle; this process has the basal part thickened and the distal fourth bent inwards and forwards; the additional process (p^5.) is long, only a little shorter than the lateral, moderately robust, somewhat curved and overreaching the lobe; the distal part of this lobe is an oblong and obliquely triangular lamella which, seen from behind, is bent inwards, covering the proximal half of the additional process. The auxiliary lobe is rather long and thick. The setiferous lobe is moderately broad, with setae along the major part of both margins, there being a naked interval on the subdistal part of the outer margin.

Length of the largest specimens of both sexes 20 mm.

Young Specimens.— In specimens measuring only 8–10.5 mm. the rostrum is a horizontal denticle and the eyes are oblong, yellowish brown, but at least generally without any difference in colour between their upper and lower half; the shape of the small lobe from the first antennular joint shows that such specimens belong to this and not to the preceding species.

Remarks.— This species is closely allied to *T. aequalis* H. J. H., but the lobe from first joint of the antennular peduncle is quite different in the two species, and the male copulatory organs are sharply distinguished especially by the feature that the spine-shaped process is well developed in *T. obtusifrons* and wanting in *T. aequalis*.

Errors and deficiencies in Sars's figures have been pointed out in the "Siboga" Report; besides Sars states that the lateral margins of the carapace have no denticle, but a minute denticle is always present.

Distribution.— Sars's type was captured in the South Pacific at Lat. 32° 36′ S., long. 137° 43′ W., but the specimens from the Hawaiian Islands mentioned by Ortmann (1905) belong to *T. aequalis*. A good many specimens were captured by the Prince of Monaco in the Eastern Atlantic between Lat. 36° 46′ N. and lat. 27° 43′ N. The Copenhagen Museum possesses a specimen from Lat. 27° 30′ S., long. 98°–99° 10′ E.

The distribution in the area explored in 1904–1905 is nearly the same as that of *T. aequalis*, but less common. Curiously enough, it has not been taken by the "Siboga" and is not found among the rather rich Copenhagen material from the Chinese and Japanese seas.

β. Carapace in the adults without denticles on the lateral margins near their posterior end.

7. **Thysanopoda pectinata** Ortmann.

Plate 5, figs. 1a–1m.

1893. *Thysanopoda pectinata* Ortmann, Ergebn. der Plankton-Exped., **2**, G., b., p. 10, taf. 1, fig. 4.
1905. *Thysanopoda pectinata* H. J. Hansen, Bull. Mus. Océan. Monaco, no. 42, p. 25.
1909. *Parathysanopoda foliifera* Illig, Zool. Anz., **35**, p. 225 (young).

Sta. 4681. Dec. 8, 1904. Lat. 18° 47.1′ S., long. 89° 26′ W. 300 fms. to surface. 1 specimen.
Sta. 4687. Dec. 11, 1904. Lat. 22° 49.5′ S., long. 97° 30.6′ W. 300 fms. to surface. 1 specimen.
Sta. 4689. Dec. 12, 1904. Lat. 24° 5′ S., long. 100° 20′ W. 300 fms. to surface. 2 specimens.
Sta. 4701. Dec. 26, 1904. Lat. 19° 11.5′ S., long. 102° 24′ W. 300 fms. to surface. 2 specimens.
Sta. 4705. Dec. 28, 1904. Lat. 15° 5.3′ S., long. 99° 19′ W. 300 fms. to surface. 14 specimens.
Sta. 4719. Jan. 14, 1905. Lat. 6° 29.8′ S., long. 101° 16.8′ W. 300 fms. to surface. 1 specimen.
Sta. 4722. Jan. 16, 1905. Lat. 9° 31′ S., long. 106° 30.5′ W. 300 fms. to surface. 1 specimen.
Sta. 4730. Jan. 20, 1905. Lat. 15° 7′ S., long. 117° 1.2′ W. 300 fms. to surface. 5 specimens (1 among them very young).
Sta. 4732. Jan. 21, 1905. Lat. 16° 32.5′ S., long. 119° 50′ W. 300 fms. to surface. 7 specimens.
Sta. 4734. Jan. 22, 1905. Lat. 17° 36′ S., long. 122° 35.6′ W. 300 fms. to surface. 1 specimen, young.
Sta. 4740. Feb. 11, 1905. Lat. 9° 2.1′ S., long. 123° 20.1′ W. 300 fms. to surface. 1 specimen.

Description.— The frontal plate is produced, in the Pacific specimens frequently nearly triangular, with the lateral margins feebly convex towards the acute end (fig. 1a), but sometimes the margins are distally more convex and the end broadly rounded, a little angular at the middle (fig. 1c); in specimens from the North Atlantic the anterior part of the frontal plate is much broader with a somewhat long and feebly curved transverse margin in front; on the end or slightly behind the end of the frontal plate a minute vertical tooth — the remainder of the rostrum in the young — is seen; the plate is very thick and longitudinally concave at the middle so that a pair of submedian keels are formed uniting at the tooth mentioned, and a little or somewhat behind the tooth begins in the bottom of the median excavation the median keel, which is rounded, rather low, increases in height at the dorsal organ and disappears somewhat before the place where the non-existent cervical groove is to be looked for; the lateral edges of the frontal plate are bent a little upwards, so that the surface becomes a little excavated along each margin. The carapace has a longitudinal furrow close at the lateral margin almost from its anterior end, and posteriorly this furrow is curved upwards along the lower half of the posterior margin; the surface of the carapace without any other groove or impression; the produced part of the anterior margin above the antennae is a small, short, acute triangle.

The eyes are somewhat small, black.— The antennulae (figs. 1a–1b) are very characteristic. The basal joint is somewhat short and very broad, with a moderately short, spiniform process at the distal outer angle; the joint is distally strongly raised as an obliquely transverse, vaulted part with a number

of strong, partly long setae, and from that part a quite peculiar lobe projects forwards, closely covering the major part of the proximal half of the second joint; the lobe is at its origin about half as broad as the base of second joint, but it is rapidly strongly expanded outwards, thus furnished with a kind of triangular lateral wing projecting outwards and somewhat downwards above the upper lateral surface of second joint; the anterior margin of the lobe, the wing included, is straight or a little concave, nearly transverse and produced in a row of 8 to 13 thin, spiniform processes which increase in length from the inner to the outer, the inner being short and directed forwards, the outer rather long and directed outwards to a great degree. The second joint is above and inwards produced in a lobe which, seen from above, covers closely the proximal third or rather two fifths of the inner half of the upper surface and the inner margin itself of third joint; seen from above the outer angle of this lobe is convex, subangular, or rounded, while the front margin of the second joint is somewhat hollowed outside the base of the lobe. The third joint with the dorsal keel well defined, scarcely half as long as the joint and rather low.— The antennal squama reaches the middle of third antennular joint, it is broad, distally subtruncate with the outer corner subrectangular and without denticle; the spiniform outer process from the subbasal joint is conspicuously or even considerably shorter than the breadth of the squama.— The maxillulae (fig. 1d) are quite peculiar; the proximal lobe has the end nearly regularly rounded; the distal lobe is extremely broad, distally strongly expanded, broader than long and twice as broad as the proximal lobe; the palp (4.) is very small, ovate, not one third as long as the distal lobe, completely covered by the pseudexopod, which is very large, twice as long as broad.

The abdominal segments are without any trace of dorsal denticles. The lateral plates of second to fourth segments with the lower margin a little emarginate. The preanal spine well developed, simple in the male, more rarely simple, but generally bifid in the female.— The uropods with the endopod slightly or somewhat longer than the telson and somewhat shorter than the exopod.— The telson with two pairs of dorsal denticles and no serration; the subterminal spines extremely long.

The copulatory organs (figs. 1e–1i) afford excellent characters. The spine-shaped process (p^1.) is rather long, thin, bent strongly inwards near the end of its first third and with the distal part somewhat curved. The terminal process (p^2.) with its proximal third thick and subcylindrical; then it is curved slightly inwards and gradually widened and flattened to the end, which is conspicu-

ously broader or even nearly twice as broad as the basal part and very broadly rounded with the terminal margin somewhat or feebly convex; besides the process is a little excavated on the anterior surface along the terminal margin, which consequently is a little raised (fig. 1f). The proximal process (p^3.) far from reaching the end of the terminal; the basal part is thick, and then the process is abruptly bent considerably inwards and its terminal third curved again in the opposite direction; at the proximal bend a short or rather long "heel" projects on the outer side; the distal third is somewhat compressed with a couple of irregular teeth on the very oblique terminal margin (fig. 1g, which shows the distal part seen from the outer side). The median lobe with the proximal half broad; the lateral process (p^4.), which is inserted at the middle of the inner margin of the lobe, is rather long, moderately slender, with the most distal part bent strongly inwards and forwards. The additional process (p^5. and fig. 1h) is a strong hook, the major, proximal part being oblong, a little curved and strongly vaulted on one side, and the distal part is somewhat slender, acute, and curved strongly outwards; when the organ is seen from behind (fig. 1e) the major part of the process is covered by the distal part of the lobe, the end of which is broadly rounded. A little beyond the insertion of the lateral process a secondary additional process (p^6.) is observed on the posterior surface of the lobe; this process is quite small and shaped as a straight needle. The auxiliary lobe of moderate size. The setiferous lobe is moderately broad, with setae along nearly the whole inner margin, the oblique distal end and the proximal half of the outer margin, while most of the distal part of this margin is naked.

Length of the largest female from the Pacific 29 mm., of adult males 24–29.5 mm. Specimens from the Atlantic are much larger; the Monaco collection contains a female 40.5 mm. long and a male 40 mm. long, while Ortmann stated that his single specimen measured 44 mm. in length.

Very young Specimens.— Figs. 1k–1m show parts of a young specimen measuring 11 mm. in length. The frontal plate is long, much longer than in the adult, somewhat shorter than broad, with the distal third of the lateral margins somewhat convex, and terminating in a small, nearly spiniform, horizontal rostrum; the upper side of the plate longitudinally concave, without submedian keels, and the median keel begins somewhat behind the frontal end, increasing conspicuously and regularly in height to the dorsal organ. The carapace has a very distinct tooth on the lateral margins a little from their posterior end. The eyes differ much from those in the adults; seen from above (fig. 1k) the stalk is much thickened; seen from the side (fig. 1l) the eye is much higher

than broad and distinctly divided by a constriction into an upper somewhat small and a lower, conspicuously broader and much higher area; the colour is dark brown. The antennulae have the process from the outer distal angle of first joint proportionately longer than in the adults; the lobe from the same joint is only a little expanded towards the end, with about six terminal teeth which are shorter than in the adults; the lobe from second joint is also shorter than in the adults.— Two such specimens are at hand.

Remarks.— This species is easily distinguished from all other forms of the genus by the terminal row of spiniform teeth on the lobe from first antennular joint.

During a long time I considered the specimens from the Pacific as belonging to a separate and new species, because the shape of their frontal plate differs materially from that of my single female specimen of *T. pectinata* from the Atlantic, and this specimen and that recorded by Ortmann are much larger than any specimen in the rich Agassiz material. But in the winter 1910–1911 I obtained from Monaco several recently captured specimens of *T. pectinata*, among them two adult males; the examination of the copulatory organs of these specimens did not reveal any difference from those from the Pacific, and I was unable to detect any other difference between the animals from the North Atlantic and those from the Pacific than the anteriorly broader and much more obtuse frontal plate in the former together with their much larger size. The result of study was that I must consider the Pacific specimens as a smaller local form or variety of *T. pectinata*.— *Nematoscelis microps* G. O. S. shows also local variation in the shape of the rostrum in both sexes and especially in the males, as is seen by comparison of specimens from the Atlantic, the Indian Archipelago, and the East Pacific (comp. the "Siboga" Report and my notes on *N. microps* in the present paper).

The young specimen just described is interesting. I have stages intermediate in size and development between that small specimen and the adults, and that it belongs to this species is easily seen from its lobe of first antennular joint. The oblong, divided eye, the shape of the frontal plate and the existence of a denticle on the lateral margins of the carapace agree completely with the features found in very young specimens of *T. orientalis* H. J. H. belonging to the same group of the genus. That Illig's *Parathysanopoda foliifera* has been founded on a young specimen of *T. pectinata* is easily seen from his description and figures; the specimen, which measured 15 mm., was captured in the Atlantic, and as the adults from this Ocean are as a rule much larger than those from the

East Pacific, I think it natural that young in the same stage of development from the two Oceans differ also somewhat in size.

Distribution.— The Monaco specimens were captured in the Eastern Atlantic more or less remote from Southern Spain; Ortmann's specimen was taken in the Northern equatorial current, and Illig's young was from the Benguela current, West of Angra Pequena. The list above shows that the distribution in the East Pacific is similar to that of *T. aequalis* or *T. obtusifrons*.

8. **Thysanopoda orientalis** H. J. Hansen.

Plate 5, figs. 2a–2i.

1910. *Thysanopoda orientalis* H. J. Hansen, Siboga-Exp., **37**, p. 85, pl. 13, figs. 2a–2i.

Sta. 4709. Dec. 30, 1904. Lat. 10° 15.2′ S., long. 95° 40.8′ W. 300 fms. to surface. 4 specimens.
Sta. 4717. Jan. 13, 1905. Lat. 5° 10′ S., long. 98° 56′ W. 300 fms. to surface. 1 specimen.
Sta. 4721. Jan. 15, 1905. Lat. 8° 7.5′ S., long. 104° 10.5′ W. 300 fms. to surface. 1 specimen.
Sta. 4722. Jan. 16, 1905. Lat. 9° 31′ S., long. 106° 30.5′ W. 300 fms. to surface. 5 specimens.
Sta. 4740. Feb. 11, 1905. Lat. 9° 2.1′ S., long. 123° 20.1′ W. 300 fms. to surface. 1 specimen.

A description is found in the paper quoted, but notes on the maxillulae, maxillae, and copulatory organs may be added here.

The maxillulae (figs. 2a–2b) are quite similar to those in *T. obtusifrons* G. O. S., but differ in minor particulars. The proximal lobe is distally a little more rounded; the distal lobe, though increasing strongly in breadth towards the end, is almost as long as broad or a little broader than long; the palp is somewhat or considerably shorter than the distal lobe, slender; the pseudexopod is very large, yet smaller than in *T. obtusifrons*, rather far from reaching the end of the distal lobe.— The maxillae (fig. 2c) are somewhat elongate, with the terminal — the fourth — joint considerably longer than the third and more than half as long again as broad. Fig. 2c shows besides the morphological composition of a maxilla in the present order of Crustacea.

The copulatory organs (figs. 2d–2i) show various fine features. The spine-shaped process is somewhat or considerably curved, of the normal shape. The terminal process is somewhat long, moderately strong, feebly curved, tapering, seen from behind (fig. 2d), from the base to rather near the end where it widens feebly and has the end itself rounded, but seen in the main from in front (fig. 2e) the terminal part is perceived to be somewhat widened and excavated, spoon shaped. The proximal process is very long, much longer than the terminal; its short proximal part is rather thick, then it is curved nearly abruptly inwards, but no "heel" is developed, and the process forms now nearly half of a circle, with the convex side turning inwards; from the proximal bend to a little from

the end the process is slender and nearly equally thick, but the rather short distal portion is conspicuously thickened and furnished with minute teeth along one margin and with 2–4 longer teeth from the margins just before the incurved, tooth-shaped end. Fig. 2f gives the distal part of this process seen from behind and fig. 2g the same part of the same specimen seen from in front; fig. 2h represents the same part, seen from behind, of another specimen in order to show variation of the armature. The median lobe has its proximal part, from its origin to the insertion of the lateral process (p^4.), long and proportionately rather narrow, longer than the distal part; the terminal portion beyond the insertion of the usual additional process (p^5.) is an oblong, distally produced, acuminate and acute lobe (fig. 2d and fig. 2i). The lateral process (p^4.) is slender, somewhat long, curved, and with the short terminal, acute part bent inwards and forwards. The additional process (p^5.) is an oblong-oval, rather thick, yet somewhat obliquely vaulted body with the distal end produced into a small, conical, oblique, acute tooth. But a little beyond the lateral process there originates a small, very slender secondary additional process (p^6.) shaped nearly as a spine with the terminal portion bent inwards (overlooked by me in the "Siboga" material). The auxiliary lobe is of moderate size and the setiferous lobe moderately broad; the latter is furnished with setae quite as in *T. pectinata*.

Length of adult males from 23 to 27.5 mm., of the largest female from the East Pacific 24.5 mm., while a large female from the "Siboga" measured 38 mm. in length.

Distribution.— Some specimens were taken at four localities in the Indian Archipelago by the "Siboga." In 1910 the Prince of Monaco captured several fine specimens at three localities in the North Atlantic West of Southern Spain.

Group b. *Carapace with a well-developed cervical groove. Maxillulae with the pseudexopod somewhat small, scarcely or not at all overreaching the outer margin of third joint and with the palp very long. Sixth abdominal segment shorter than the fifth.*

9. **Thysanopoda cornuta** Illig.

1905, March 28. *Thysanopoda cornuta* Illig, Zool. Anz., **28**, p. 663 (with three figures in the text).
1905, April 1. *Thysanopoda insignis* H. J. Hansen, Bull. Mus. Océan. Monaco, no. 30, p. 19 (with three text-figures).

Sta. 4670. Nov. 20, 1904. Lat. 12° 8.7′ S., long. 79° 2.4′ W. Trawl, 3209 fms. 1 specimen.

The single specimen is an extremely large female measuring 75 mm. in length, but unfortunately considerably damaged. It agrees excellently with my preliminary description and figures in the paper quoted.

Distribution.— Illig's type was taken in the tropical Atlantic, in the Benguela current off Angra Pequena, in a vertical haul from 4000 m. to surface. The Monaco specimens were captured at Lat. 27° 43′ N., long. 18° 28′ W., 3000 to 0 m., and the depth of the Station was 3817 m.— This gigantic species is certainly bathypelagic.

(?) **Thysanopoda cornuta** Illig. *Juv.*

Plate 6, figs. 1a–1e.

Sta. 4679. Dec. 7, 1904. Lat. 17° 26.4′ S., long. 86° 46.5′ W 300 fms. to surface. 1 specimen.

The specimen measures 14.5 mm. in length. The thoracic legs, which are well developed, shows that it belongs to the genus Thysanopoda; the shape or rather the stage of development of the maxillulae (fig. 1c) and the maxillae (fig. 1d) together with the fact that the uropods are very short in comparison with the telson (fig. 1e) proves with absolute certainty that the specimen is very young. The sixth abdominal segment is shorter than the fifth, which shows that the specimen belong to Group b of this genus. And with little doubt I consider it to be a specimen of *T. cornuta* near the end of its larval life.

Description.— The frontal plate is very large (fig. 1a) with a considerable portion of the lateral margin, subparallel, the distal outer angles rounded, the front margin very long, in the main transverse, being a little produced at the middle as a small very low triangle and the part of the margin outside this triangle distinctly concave. The median keel between the cervical groove and the front end is well developed. The integument of the carapace is somewhat thin, but the cervical groove and the lateral grooves connected with it seem to agree with my figures of the adult, while the longitudinal lateral furrows cannot be discerned; the lateral margins seem to have no real denticle.

The eyes are of moderate size, nearly black; the small process found in the adult on the outer distal angle of the eye-stalks has not yet been developed.— The antennulae (fig. 1b) show considerable similarity with those in the adult, but the basal joint is still without its upper distal lobe, and the process from the outer distal angle is long, as might be expected.— The antennal squama with a distinct tooth from the outer distal angle.— The maxillulae (fig. 1c) show larval characters; the small exopod (ex) is present, while a vestige of a pseudexopod is rudimentary; the palp (4) has certainly not yet obtained its final length and only very few of its setae.— The maxillae (fig. 1d) show the aspect as in older larvae.

The upper surface of the fourth and fifth abdominal segments show quite, as in the adults, feeble rudiments of three longitudinal keels, while the sixth segment has not yet obtained the flat dorsal excavation limited by feeble lateral carinae found in the adult.— The uropods are much shorter than the telson, a feature due to the young age of the specimen.

Remarks.— That the specimen is a young of one of the species of Group b is certain. This group comprises hitherto only two species; judging from various particulars I think the specimen studied belongs to *T. cornuta*, not to *T. egregia*. It is, of course, possible, but in my opinion very improbable, that it belongs to an otherwise hitherto unknown species.

10. **Thysanopoda egregia** H. J. Hansen.

1905. *Thysanopoda egregia* H. J. Hansen, Bull. Mus. Océan. Monaco, no. 30, p. 22 (with two figures in the text).

Sta. 4722. Jan. 16, 1905. Lat. 9° 31′ S., long. 106° 30.5′ W. 300 fms. to surface. 1 specimen.

Remarks.— The single specimen measures 27 mm. in length; it is a female and, judging from its size, probably immature, as the single other specimen hitherto known, the male in the Monaco collection, is 44 mm. long. It agrees on the whole with the description in the Monaco paper, excepting that the third antennular joint is slightly tapering in breadth towards the end and the lower flagellum simple, while in the male figured that peduncular joint is slightly thickened towards the end and the basal part of the lower flagellum much thickened and furnished with a thick tuft of thin setae. Seen from the side, the upper margin of the carapace between the dorsal organ and the front end is more convex, being towards the front end curved more downwards, than in the Monaco specimen.

Two other points may be mentioned. In the Monaco specimen a straight furrow runs along the side of the carapace considerably above the margin from the posterior margin to a little behind the cervical groove, and the upper margin of that furrow is raised and thickened so much that it looks like as a keel; in the smaller Agassiz specimen the furrow is scarcely distinct but the keel very conspicuous. In the description of the Monaco specimen I stated that the fourth to sixth abdominal segments have a dorsal keel along the posterior part of the median line of each, but there is no median keel on the sixth segment; the passage alluded to is correct as to the other particulars.

Distribution.— The single specimen previously known was captured at Lat. 30° 41′ N., long. 17° 46′ W., 2500 to 0 m.

NYCTIPHANES G. O. Sars (1883).

As the endopod of the penultimate pair of thoracic legs is long, but only two-jointed, this genus ought to find its place between Thysanopoda and Euphausia, as already stated by Ortmann in 1894. G. O. Sars established the genus on a species, *N. australis* G. O. S., from the Southeastern and Eastern coasts of Australia, and referred *Thysanopoda norvegica* M. Sars to the same genus, believing that *T. couchi* Bell possibly might be identical with the latter form. In 1905 Holt and Tattersall established the genus Meganyctiphanes on *T. norvegica*, pointing out that it differed from Nyctiphanes G. O. S., comprising *N. couchi* Bell and *N. australis* G. O. S., in the following particulars:— fifth and sixth pairs of thoracic legs with an endopod in both sexes, while an endopod on these legs is present in the male and wanting in the female; furthermore, in Nyctiphanes the antennular peduncle is "considerably stouter in the adult male than in the female", but in Meganyctiphanes the same peduncle is "scarcely, if at all" stouter in the male than in the other sex; finally, the females of Nyctiphanes carry their eggs "in paired pyriform masses," but on Meganyctiphanes ovisacs have never been found. I may add that the male copulatory organs on the first pleopods afford excellent generic characters; in Meganyctiphanes the organs are nearly as in Thysanopoda and the inner lobe short with its three processes well developed as in that genus; in Nyctiphanes (Plate 6, fig. 2h and fig. 3e) the inner lobe is quite peculiar, being extremely produced as an oblong, more or less triangular plate with the outer margin sinuate and partly serrate, and this lobe has the spine-shaped process well developed as in Meganyctiphanes, while the terminal and the proximal processes are quite wanting.

The genus Nyctiphanes comprises four species. Two species, *N. australis* G. O. S. and *N. couchi* Bell, were established in the earlier literature; in 1911 I published preliminary descriptions of the two additional species, *N. simplex* H. J. H. and *N. capensis* H. J. H. and besides I pointed out that *N. latifrons* Illig (1908) taken West of Northern Africa was established on very young specimens of *N. couchii* Bell.

The Agassiz collection contains specimens of *N. simplex* H. J. H., but for various reasons, and especially as Ortmann has referred specimens taken by Agassiz in the Pacific to *N. australis*, I redescribe also this species for comparison with *N. simplex*.

11. **Nyctiphanes simplex** H. J. Hansen.

Plate 6, figs. 2a–2i (adult and subadult); Plate 7, figs. 1a–1b (Young).

1911. *Nyctiphanes simplex* H. J. Hansen, Bull. Mus. Océan. Monaco, no. 210, p. 20.

Sta. 4576. Oct. 8, 1904. Lat. 29° 52′ N., long. 116° 56′ W. Surface. 3 specimens

Sta. 4641. Nov. 7, 1904. Lat. 2° 13.3′ S., long. 89° 42.2′ W. Surface. 1 ovigerous female and 1 young.

Sta. 4652. Nov. 11, 1904. Lat. 5° 41.7′ S., long. 82° 39.5′ W. Surface. 7 immature or young specimens. 100 fms. to surface. 2 immature or young specimens.

Sta. 4655. Nov. 12, 1904. Lat. 5° 57.5′ S., long. 80° 50′ W. Surface. 43 specimens (18 young).

Sta. 4715. Jan. 2, 1905. Lat. 2° 40.4′ S., long. 90° 19.3′ W. 300 fms. to surface. 2 adult specimens (♂ Type, and ♀).

Description.— The frontal plate moderately long, triangular, subacute, with its margin considerably raised; and the median keel begins a little behind the tip (fig. 2a) and reaches the distinct cervical groove; the median area between the frontal plate and that groove is considerably vaulted. As in the other forms of the genus, the carapace of the adult and subadult has no denticle or angle on the lateral margin.

Eyes moderately large.— The antennular peduncles very characteristic; in both sexes the first joint is, at the outer distal corner, produced in a very conspicuous protuberance which, seen from above (figs. 2c and 2e) is directed forwards and somewhat outwards, is subconical, very thick at the base and acuminate at the end; the upper terminal leaflet is very large, directed somewhat or much backwards and considerably or a little upwards; considerably longer than broad at the base; scarcely twice as broad at the base as at the end, which is broadly rounded or nearly truncate with the terminal outer angle produced into a small triangle and frequently curved considerably upwards and forwards (fig. 2d); the upper surface of the leaflet is excavated, especially near the base; finally, outwards below the base of the leaflet a transverse, vaulted part is seen. The second joint in the female (figs. 2d and 2e) is very long, somewhat slender, with an oblique, subacute tooth at the upper distal inner angle; in the male (fig. 2b and 2e) this joint is a little shorter and conspicuously, even considerably thicker than in the female, and the upper distal tooth is much broader, subvertical, triangular, or somewhat bifid. Third joint in both sexes much shorter than second, in the female slender, somewhat keeled above towards the end and the keel terminating in a short, acute tooth (fig. 2d); in the male (figs. 2b and 2e) this joint is much thicker, without any tooth, but, seen from above, conspicuously curved, with the outer margin very convex, the inner somewhat concave and near its middle adorned with a bundle of three short and very strong setae.

In more than half-grown, but immature, specimens the leaflet of first joint is more rapidly and evenly narrowed, not truncate, but with the terminal portion produced much upwards and considerably outwards (fig. 2f), the inner margin being very convex towards the acute tip and the outer considerably concave; the tooth at the end of second joint is much longer and the acuminate part of the outer distal protuberance of the first joint considerably longer than in the adults.— The antennal squama does not reach the end of second antennular joint (fig. 2a); its terminal margin is transverse or a little oblique, with the outer denticle very distinct; the two distal joints of the stalk of the endopod are similar in both sexes.

Sixth abdominal segment with a distinct dorsal spiniform tooth at the end.

The copulatory organs (figs. 2h–2i) afford some specific characters. The distal half of the inner lobe (li.) is subtriangular, rounded at the end; the distal two thirds of the free outer margin of this lobe is serrate, and its proximal half shows two obtuse protuberances between which the margin is rather concave. The median lobe (lm.) is extremely short, cut off transversely, and from the inner part of the terminal margin the somewhat long lateral process (p^4.) projects; this process is bent a little outwards at the acute end.

Length of the largest male 11.5 mm., of the largest female 14 mm. One of Ortmann's males from the Gulf of Panama is 13.2 mm. long.

Very young Specimens[1] (Plate 7, figs. 1a–1b).— The specimen figured measures 7 mm.; other somewhat smaller specimens are at hand.— The frontal plate is at the base as broad as the carapace; it is much produced, longitudinally concave, its lateral margins are sinuate, being proximally convex and distally concave, and the plate is distally truncate, even flatly emarginate, each angle being produced in an acute tooth; at the end the plate is about one third as broad as at the base. In the largest specimen the carapace has scarcely any angle on the lateral margin somewhat before the hind margin, but in the other specimens an angle or generally a small denticle is distinct. The eyes are extremely large. The leaflet of first antennular joint in the largest specimen directed upwards and somewhat backwards, somewhat excavated above beyond the base, a little longer than broad, nearly oblong-triangular, with the inner margin straight, the outer somewhat convex, and the distal part produced in an acute tip bent upwards and somewhat forwards but not outwards; in somewhat smaller specimens the leaflet is proportionately smaller and less developed; the process from the outer distal angle of first joint very long. Second and third antennular joints in the main as in the subadult.

[1] The larvae of this species are dealt with, p. 288–290.

Remarks.— This species is allied to *N. australis* G. O. S., but differs in several features. In order to point out and illustrate these differences I have given on Plate 6 figures of the antennular peduncles of both sexes and of the copulatory organs of *N. australis*; the figures were drawn from two cotypes of Sars.

The leaflet from first joint is much smaller than in *N. simplex* and considerably broader than long (figs. 3a–3d), subtriangular, with the outer margin convex and very oblique, and it terminates in a more or less acute tip bent upwards and, in one of the specimens drawn, somewhat forwards and placed almost above the inner margin of the joint, furthermore no transverse, vaulted part is seen at the outer side below the base of the leaflet. The antennular peduncles in the male are still somewhat thicker, those of the female still more slender than in *N. simplex*. In the male (fig. 3a and 3b) a high, compressed, keel-shaped protuberance is seen near the end of second peduncular joint, and the third joint is somewhat thicker than in *N. simplex*, with about six minute hairs, but no stiff setae, on the inner side. The copulatory organs (fig. 3e) have the most distal part of the inner lobe considerably broader than in *N. simplex*, the proximal half of the outer margin of this lobe differs in the shape of the protuberances from that species, but the most important difference is shown by the median lobe (lm.), which in *N. australis* has the lateral process placed as in *N. simplex*, but the lobe itself projects along that process to its end; if this lobe had been cut off opposite the insertion of the process we would have the structure found in *N. simplex*. The female examined of *N. australis* is 13.5 mm., the male 15 mm.

Distribution.— In 1894 Ortmann (Bull. Mus. Comp. Zoöl., **25**, p. 100) enumerated nine localities for *Nyctiphanes australis*: — Gulf of Panama, Galapagos, Gulf of California, and some Stations in the Northern Pacific between San Francisco, and the Hawaiian Islands. From the U. S. National Museum I have received specimens from these Stations and an examination gave the result, that the two specimens from "Survey" Sta. 54 and "Survey" Sta. 74, both Stations in the North Pacific between San Francisco and the Hawaiian Islands, are males of *Euphausia recurva* H. J. H., while the specimens from the seven other Stations belong to *N. simplex* and not to *N. australis*. The latter species is hitherto only known from the sea around the Southeastern part of Australia; in 1911 I established *N. capensis* on the specimens mentioned by Stebbing in 1905 and 1910 as taken off Cape St. Blaize, South coast of Africa, and by him referred to *N. australis*.

EUPHAUSIA Dana (1852).

Some statements on the copulatory organs of the male first pleopods in this genus may be given here. The spine-shaped process is wanting (yet I found this process developed in the normal way in one of the specimens examined of *E. lucens* H. J. H.); the terminal and the proximal processes are well developed. The median lobe is, as in Thysanopoda, separated from the inner lobe and has the lateral process strong and inserted at a considerable distance from its base, but it has generally no additional process, though this process is present as a small spine in *E. mucronata* G. O. S. and as a mere rudiment in *E. gibboides* Ortm. The auxiliary lobe is well developed, oblong; the setiferous lobe is normal, with the pouch on the posterior surface very conspicuous.

The genus comprises twenty-seven species, fourteen of which are represented in the material from the East Pacific. These species belong to three of the four groups into which I divide the genus.

Group *a*. *Species with two pairs of lateral denticles on the carapace. No dorsal process on third to fifth abdominal segment.*

12. **Euphausia eximia** H. J. Hansen.

Plate 7, figs. 2a–2g.

1911. *Euphausia eximia* H. J. Hansen, Bull. Mus. Océan. Monaco, No. 210, p. 23.

Sta. 4580. Oct. 10, 1904. Lat. 24° 55′ N., long. 112° 45′ W. 300 fms. to surface. 5 specimens.
Sta. 4598. Oct. 15, 1904. Lat. 15° 58′ N., long. 98° 13′ W. 300 fms. to surface. 2 specimens.
Sta. 4605. Oct. 17, 1904. Lat. 12° 21′ N., long. 92° 13′ W. 300 fms. to surface. 2 young specimens.
Sta. 4611. Oct. 18, 1904. Lat. 10° 33′ N., long. 88° 30′ W. Surface. 6 specimens.
Sta. 4615. Oct. 19, 1904. Lat. 9° 7′ N., long. 85° 11′ W. Surface. 5 specimens (1 large, 3 quite small).
Sta. 4619. Oct. 20, 1904. Lat. 7° 15′ N., long. 82° 8′ W. Surface. 9 specimens (1 large, 8 small).
Sta. 4644. Nov. 7, 1904. Lat. 2° 13.3′ S., long. 89° 42.2′ W. Surface. 29 specimens (several of which adult).
Sta. 4649. Nov. 10, 1904. Lat. 5° 17′ S., long. 85° 19.5′ W. 300 fms. to surface. 2 specimens.
Sta. 4650. Nov. 10, 1904. Lat. 5° 22′ S., long. 84° 39′ W. 300 fms. to surface. 14 specimens.
Sta. 4652. Nov. 11, 1904. Lat. 5° 44.7′ S., long. 82° 39.5′ W. { Surface. 74 specimens. / 100 fms. to surface. 43 specimens. / 200 fms. to surface. 45 specimens. / 400 fms. to surface. 45 specimens.
Sta. 4655. Nov. 12, 1904. Lat. 5° 57.5′ S., long. 80° 50′ W. 400 fms. to surface. 18 specimens.
Sta. 4657. Nov. 13, 1904. Lat. 7° 12.5′ S., long. 84° 9′ W. { Surface. 1 specimen. / 300 fms. to surface. 42 specimens.
Sta. 4659. Nov. 14, 1904. Lat. 8° 54.5′ S., long. 86° 5.5′ W. { Surface. 7 specimens. / 300 fms. to surface. 80 specimens.
Sta. 4661. Nov. 15, 1904. Lat. 10° 17′ S., long. 88° 2′ W. 300 fms. to surface. 19 specimens.
Sta. 4663. Nov. 16, 1904. Lat. 11° 20.3′ S., long. 88° 55.2′ W. 300 fms. to surface. 5 specimens.
Sta. 4664. Nov. 17, 1904. Lat. 11° 30.3′ S., long. 87° 19′ W. 300 fms. to surface. 10 specimens.
Sta. 4665. Nov. 17, 1904. Lat. 11° 45′ S., long. 86°5.2′ W. { Surface. 5 specimens. / 300 fms. to surface. 46 specimens.

Sta. 4667.	Nov. 18, 1901.	Lat. 11° 59.5′ S., long. 83° 40.1′ W.	Surface. 1 specimen. 300 fms. to surface. 41 specimens.
Sta. 4668.	Nov. 19, 1901.	Lat. 12° 9.3′ S., long. 81° 45.2′ W.	Open part of Tanner net, 300 fms. to surface. 28 specimens. (Type, 1 ♂).
Sta. 4669.	Nov. 19, 1904.	Lat. 12° 12.7′ S., long. 80° 25.6′ W.	Surface. 1 specimen. 300 fms. to surface. 42 specimens.
Sta. 4671.	Nov. 20, 1901.	Lat. 12° 6.9′ S., long. 78° 28.2′ W.	Surface. 1 specimen. 300 fms. to surface. 16 specimens.
Sta. 4673.	Nov. 21, 1904.	Lat. 12° 30.5′ S., long. 77° 49.4′ W.	300 fms. to surface. 13 specimens.
Sta. 4676.	Dec. 5, 1901.	Lat. 14° 28.9′ S., long. 81° 24′ W.	300 fms. to surface. 8 specimens.
Sta. 4711.	Dec. 31, 1901.	Lat. 7° 47.5′ S., long. 91° 5.5′ W.	300 fms. to surface. 1 specimen.
Sta. 4715.	Jan. 2, 1905.	Lat. 2° 40.4′ S., long. 90° 19.3′ W.	300 fms. to surface. 11 specimens.
Sta. 4716.	Jan. 2, 1905.	Lat. 2° 18.5′ S., long. 90° 2.6′ W.	Surface. 2 specimens. 600 fms. to surface. 6 specimens.
Sta. 4719.	Jan. 14, 1905.	Lat. 6° 29.8′ S., long. 101° 16.8′ W.	300 fms. to surface. 1 specimen.
Sta. 4742.	Feb. 15, 1905.	Lat. 0° 3.4′ N., long. 117° 15.8′ W.	300 fms. to surface. 9 specimens.

Description.— The frontal plate (fig. 2a) is a very short triangle with the margins somewhat sinuate; it terminates in a well-developed, slender rostrum which is considerably or much longer than the breadth of second antennular joint. The oblong dorsal area behind the frontal plate is considerably vaulted and the keel along this area and forward to near the middle of the rostrum, is high; seen from the side with its upper margin above the area mentioned it is considerably curved and even sometimes feebly angular.

Eyes moderately large, black.— Antennular pedunceles similar in both sexes, moderately robust; first joint nearly as long as the sum of the two others, seen from above (fig. 2a) a little more than twice as long as broad; the terminal lobe is a transverse plate directed forwards and upwards, at the base half as broad or more than half as broad as the end of the joint, its outer margin is directed considerably outwards, so that the terminal margin is longer than the base (fig. 2c) and this margin bears a row of 9–10 spiniform processes, the inner short, from there increasing in length outwards with those at the outer margin long and directed forwards and outwards. The second joint slightly longer than the third, its upper distal margin distinctly oblique, from near the outer side directed somewhat forwards, at a short distance from the outer margin with a rather long, a little curved, spiniform process directed essentially forwards; a little behind the terminal margin and rather near the inner margin projects another process as long as, or longer than, the first named, and it is either simple (fig. 2c) or bifurcate (fig. 2d), in the latter case terminating in two spines. Third joint with the dorsal keel occupying nearly two thirds of the upper margin; seen from the side (fig. 2b) high and, if fully developed and preserved, with the uppermost part projecting forwards as a small triangle, just below which the front margin of the keel is considerably concave.— The antennal squama reaches the

middle of the third joint of the antennular peduncles and is of very moderate breadth; the spiniform outer process from the second peduncular joint is very long, half, or more than half, as long as the squama.

The copulatory organs (figs. 2e–2g) afford good characters. The terminal process (p^2.) is somewhat long, with the foot well developed and the heel short; somewhat more than its proximal half moderately thick and straight, while its distal portion is evenly curved, gradually tapering to the acute end and curved forwards, so that its curvature must be seen from the inner side (fig. 2f); a slender, spiniform, nearly straight, acute, very thin-walled process originates where the curvature begins and does not reach the end of the main process. The proximal process (p^3.) is rather long, considerably bent somewhat from the base and a little curved slightly beyond the middle; its basal part is somewhat thickened on the outer side, the remainder moderately slender, the distal portion much flattened, seen from behind (fig. 2e) very thin towards the end; seen from the inner side (fig. 2f) with the rather short distal part somewhat expanded, forming a very oblique, distally rounded plate with the posterior margin concave, and the anterior margin very convex with a small protuberance about where the curvature begins. The median lobe with the proximal portion somewhat less than twice as broad as the part beyond the insertion of the lateral process; the most distal part of the lobe suddenly strongly expanded backwards, seen from behind (fig. 2e) therefore this expansion mainly turns its posterior edge towards the observer, while seen from the inner side (fig. 2g) the expanded part shows its form to be a broad triangle; the lateral process (p^4.) is moderately large, with the base thick and the distal part slender and broadly curved, without any dorsal tooth. The auxiliary lobe is long. The setiferous lobe has the same breadth from before the insertion of the auxiliary lobe to rather near the end which is partly truncate, partly somewhat triangularly produced, with about seven setae, while the parallel lateral margins of the lobe are naked.

Length of one of the largest specimens 20 mm., but most adult specimens are somewhat smaller, about 16–17 mm.

Remarks.— This species is allied to the two Atlantic species *E. krohnii* Brandt and *E. americana* H. J. H., but it differs from both in some good characters, derived from the antennulae and the shape of the two processes on the inner lobe of the copulatory organs. In Bull. Mus. Océan. Monaco, no. 210, I have pointed out the main differences between these three species, with outlines of the two important processes on their copulatory organs.

Distribution.— The long list of localities with the number of specimens

enumerated above proves that *E. eximia* must be extremely common in the major part of the area of the East Pacific investigated by Dr. Agassiz in 1904–1905, but yet not found South of Lat. $14\frac{1}{2}^{\circ}$ S., in the whole southwestern part South of the line, towards Manga Reva, nor in the inner part of the Gulf of Panama; and not a specimen has been taken near the Fiji Islands, nor, so far as I know at present, in the tropical West Pacific.— The list shows that the species was rather frequently taken at the surface.

13. **Euphausia recurva** H. J. Hansen.

Plate 7, figs. 3a–3n.

1905. *Euphausia recurva* H. J. Hansen, Bull. Mus. Océan. Monaco, no. 42, p. 13.

Sta. 4576. Oct. 8, 1904. Lat. 29° 52′ N., long. 116° 56′ W. Surface. 24 ♂, 1 ♂ juv., 1 ♀.

Description.— The frontal plate (fig. 3a) very short and shaped as in *E. eximia*; the rostrum is very acute, shaped as a rather narrow or very narrow triangle, from a little to considerably longer than the breadth of second antennular joint; the keel from the basal part of the rostrum to the posterior end of the oblong dorsal area nearly as in *E. eximia*.

The eyes are medium sized, a little smaller than in *E. eximia*.— The antennular peduncles show interesting features. The basal joint is slightly more than twice as long as broad, as long as the sum of the two other joints, and the upper distal lobe differs extremely in the two sexes. In the male (figs. 3b and 3c) it is a very oblong-triangular plate much longer than broad, longitudinally somewhat curved so that it is less or more hollowed, at the base from a little less to a little more than half as broad as the end of the joint, at the end acute or even acuminate, directed upwards and somewhat backwards. In the female the lobe is vertical or a little recurved (figs. 3d and 3e), somewhat more than half as broad as the end of the joint, with the lateral margins subparallel, while the distal margin is deeply and more or less obliquely concave; the distal part of the lobe is therefore shaped as two triangular, acute processes either nearly equal in length or the inner somewhat or much longer than the outer, which sometimes is short. The two distal antennular joints are thicker in the male than in the female. Second joint increases somewhat in breadth from the base to considerably beyond the middle; its terminal upper margin is somewhat oblique; a little inside and behind the distal outer angle a thick, angular protuberance or short, obliquely conical tubercle is seen, while a little inside and behind the distal inner angle a slender, spiniform, acute process projects forwards

and a little upwards, and this process is sometimes even proportionately long and at least considerably longer than the outer dorsal tubercle. Third joint a little shorter than the second; its dorsal keel is very high, shaped nearly as in *E. eximia*, with the triangular, acute tooth beyond the middle and the rounded incision below that tooth well developed.— The antennal squama slightly broader than in *E. eximia*, reaching the middle of third antennular joint; the spiniform process from the antennal peduncle reaches the middle of the squama.

The copulatory organs (figs. 3f–3n) show some minor differences from those in *E. eximia*. The terminal process (figs. 3f–3h) in the main as in that species, being a little shorter and thicker, with the heel somewhat longer and the distal secondary process shorter, thicker, and obtuse. The proximal process is shorter and thicker than in *E. eximia*, with the basal third somewhat inflated on the outer side; about at the beginning of the distal third it is bent somewhat inwards, and its terminal part is, seen from behind, a flattened plate somewhat expanded on the outer (distal) side, but the end of the plate varies much in shape, even in specimens from the same locality, as is shown by four figures (figs. 3i–3n); sometimes the end is nearly cut off obliquely with the inner angle acute and feebly produced (figs. 3i and 3k), sometimes the end is deeply incised and the inner corner produced into an acute (fig. 3l) or obtuse (fig. 3n), narrow process much longer than broad, while the most distal angle formed by the terminal and the outer margin is always rounded, but sometimes nearly rectangular (figs. 3m and 3n), sometimes very obtuse (figs. 3k and 3i). The median lobe with its lateral process and the setiferous lobe nearly as in *E. eximia*; the auxiliary lobe is very long.

The specimens taken at Sta. 4576 are somewhat small, 11–12 mm., long, but the species varies much in size, and a female from Lat. 34° 50′ S., long. 25° 30′ E. measures even 18 mm. in length.

Remarks.— The male of this species is easily distinguished from all other forms of the genus by the shape and direction of the lobe from first antennular joint. In the female the shape of this lobe is to some degree similar to that in the three following species, but the female of *E. recurva* is easily separated from the other forms by the acute, slender, and spiniform process above near the distal inner angle of second antennular joint; in *E. diomedeae* Ortm. this process is replaced by a triangular protuberance, while in *E. mutica* H. J. H. and *E. brevis* H. J. H. there is no armature at the upper inner angle of second joint; finally in *E. diomedeae* and *E. mutica* the lobe from first joint is directed upwards and considerably forwards.

Distribution.— Of this species the Copenhagen Museum possesses a large mass of material from twenty-eight localities; eleven of these Stations are in the Southern Atlantic between Lat. 18° S. and Lat. 36° 10′ S., sixteen Stations are situated in a transverse belt across the southern part of the Indian Ocean between Lat. 25° 40′ S. and Lat. 40° 4′ S., and from near the southern end of Africa to about Long. 100° E.; finally one Station near Japan, viz. Lat. 31° 20′ N., long. 132° 29′ E.— It has been stated above that the specimens from "Survey" Sta. 54 (Lat. 35° 3.5′ N., long. 129° 5′ W.) and "Survey" Sta. 74 (Lat. 30° 4.5′ N., long. 133° 56.5′ W.) referred by Ortmann to *Nyctiphanes australis* are males of *E. recurva*, finally it may be stated that Ortmann's *Euphausia pellucida* Dana comprises specimens of several species, among which there are also specimens of *E. recurva*, but a revision of this material is postponed for a future paper on the Euphausiacea in the U. S. National Museum.

14. **Euphausia diomedeae** Ortmann.

Plate 7, fig. 4a.

1894. *Euphausia diomedeae* Ortmann, Bull. Mus. Comp. Zoöl., **25**, p. 102, plate, fig. 3.
1910. *Euphausia diomedeae* H. J. Hansen, Siboga-Exp., **37**, p. 91, pl. 13, figs. 4a–4e.

Sta. 4574. Oct. 8, 1901. Lat. 30° 35′ N., long. 117° 15′ W. 300 fms. to surface. 3 specimens.
Sta. 4587. Oct. 12, 1904. Lat. 20° 40′ N., long. 107° 25′ W. 300 fms. to surface. 3 specimens.
Sta. 4588. Oct. 12, 1904. Lat. 19° 52′ N., long. 106° 22′ W. Surface. 74 specimens (includ. larvae).
Sta. 4594. Oct. 14, 1904. Lat. 17° 20′ N., long. 101° 32′ W. 300 fms. to surface. 1 specimen.
Sta. 4596. Oct. 14, 1904. Lat. 16° 47′ N., long. 100° 27′ W. Surface. 2 specimens.
Sta. 4598. Oct. 15, 1904. Lat. 15° 58′ N., long. 98° 13′ W. 300 fms. to surface. 2 specimens.
Sta. 4605. Oct. 17, 1904. Lat. 12° 21′ N., long. 92° 13′ W. 300 fms. to surface. 2 specimens.
Sta. 4607. Oct. 17, 1904. Lat. 12° 00′ N., long. 91° 30′ W. Surface. 32 specimens.
Sta. 4609. Oct. 18, 1904. Lat. 11° 05′ N., long. 89° 35′ W. 300 fms. to surface. 2 specimens.
Sta. 4611. Oct. 18, 1904. Lat. 10° 33′ N., long. 88° 30′ W. Surface. 5 specimens.
Sta. 4613. Oct. 19, 1904. Lat. 9° 45′ N., long. 86° 20′ W. 300 fms. to surface. 1 specimen.
Sta. 4615. Oct. 19, 1904. Lat. 9° 7′ N., long. 85° 11′ W. Surface. 1 specimen.
Sta. 4619. Oct. 20, 1904. Lat. 7° 15′ N., long. 82° 8′ W. Surface. Several hundred specimens.
Sta. 4634. Nov. 4, 1904. Lat. 4° 35.4′ N., long. 83° 32.3′ W. 300 fms. to surface. 20 specimens (2 of which are larvae).
Sta. 4635. Nov. 4, 1904. Lat. 3° 52.5′ N., long. 84° 14.3′ W. Surface. 106 specimens plus 112 young and larvae.
Sta. 4637. Nov. 5, 1904. Lat. 1° 31′ N., long. 86° 32′ W. 300 fms. to surface. 55 specimens.
Sta. 4638. Nov. 6, 1904. Lat. 0° 27′ N., long. 87° 13′ W. 300 fms. to surface. 5 specimens.
Sta. 4640. Nov. 6, 1904. Lat. 0° 39.4′ S., long. 88° 11′ W. Surface. More than a hundred specimens.
Sta. 4644. Nov. 7, 1904. Lat. 2° 13.3′ S., long. 89° 42.2′ W. Surface. 63 specimens.
Sta. 4646. Nov. 8, 1904. Lat. 4° 1.6′ S., long. 89° 16.3′ W. { Surface. 2 specimens. / 300 fms. to surface. 6 specimens (2 of which are larvae).
Sta. 4648. Nov. 9, 1904. Lat. 4° 43′ S., long. 87° 7.5′ W Surface. 3 specimens.
Sta. 4649. Nov. 10, 1904. Lat. 5° 17′ S., long. 85° 19.5 ′W. 300 fms. to surface. 2 specimens.
Sta. 4652. Nov. 11, 1904. Lat. 5° 44.7′ S., long. 82° 39.5′ W. 100 fms. to surface. 2 specimens.
Sta. 4659. Nov. 14, 1904. Lat. 8° 54.5′ S., lat. 86° 5.5′ W. { Surface. 1 specimen. / 300 fms. to surface. 1 specimen.
Sta. 4665. Nov. 17, 1904. Lat. 11° 45′ S., long. 80° 5.2′ W. 300 fms. to surface. 1 specimen.

Sta. 4706. Dec. 28, 1904. Lat. 14° 18.7′ S., long. 98° 45.8′ W. Surface. 4 specimens.
Sta. 4707. Dec. 29, 1904. Lat. 12° 33.2′ S., long. 97° 42′ W. 300 fms. to surface. 6 specimens.
Sta. 4708. Dec. 29, 1904. Lat. 11° 40′ S., long. 96° 55′ W. Surface. 13 specimens.
Sta. 4709. Dec. 30, 1904. Lat. 10° 15.2′ S., long. 95° 40.8′ W. 300 fms. to surface. 25 specimens.
Sta. 4710. Dec. 30, 1904. Lat. 9° 30.5′ S., long. 95° 8.3′ W. Surface. 119 specimens (107 of which are pulli or larvae).
Sta. 4712. Dec. 31, 1904. Lat. 7° 5′ S., long. 93° 35.5′ W. Surface. 7 specimens.
Sta. 4713. Jan. 1, 1905. Lat. 5° 35.3′ S., long. 92° 21.6′ W. 300 fms. to surface. 4 specimens.
Sta. 4714. Jan. 1, 1905. Lat. 4° 19′ S., long. 91° 28.5′ W. Surface. 5 specimens.
Sta. 4716. Jan. 2, 1905. Lat. 2° 18.5′ S., long. 90° 2.6′ W. Surface. 4 specimens.
Sta. 4717. Jan. 13, 1905. Lat. 5° 10′ S., long. 98° 56′ W. 300 fms. to surface. 5 specimens.
Sta. 4720. Jan. 14, 1905. Lat. 7° 13.3′ S., long. 102° 31.5′ W. Surface. 1 specimen.
Sta. 4721. Jan. 15, 1905. Lat. 8° 7.5′ S., long. 104° 10.5′ W. 300 fms. to surface. 17 specimens.
Sta. 4722. Jan. 16, 1905. Lat. 9° 31′ S., long. 106° 30.5′ W. 300 fms. to surface. 11 specimens.
Sta. 4732. Jan. 21, 1905. Lat. 16° 32.5′ S., long. 119° 59′ W. 300 fms. to surface. 1 specimen.
Sta. 4742. Feb. 15, 1905. Lat. 0° 3.4′ N., long. 117° 15.8′ W. 300 fms. to surface. 12 specimens.
Sta. 4743. Feb. 15, 1905. Lat. 0° 21.3′ N., long. 117° 2.6′ W. Surface. 8 specimens.

Furthermore the species was taken by two earlier expeditions.

Fiji Isl. Dec. 11, 1897. 6 m. South of Suva lightship. 3 specimens. A. Agassiz.
Fiji Isl. Dec. 11, 1897. 3 m. South of Suva lightship. 2 specimens. A. Agassiz.
Hyd. Sta. 3789. Sept. 9, 1899. Lat. 2° 38′ N., long. 137° 22′ W. Surface. 39 specimens. "Albatross."

It may be added that specimens with the frontal plate more or less expanded, thus the typical *E. diomedeae* sens. Ortmann, were found among the material from the following Stations: — 4619, 4635, 4721, and 4742.

To the description given in the "Siboga" Report a few notes may be added. The figure of the anterior part of an animal of the typical *E. diomedeae* Ortmann exhibits the enormous expansion of the frontal plate with the reduced rostrum. The great majority of the "Albatross" specimens agree completely with the "Siboga" specimens in having the short frontal plate developed nearly as in *E. recurva*, and the rostrum slender and about as long as the distal joint of the eye-stalks, but in some few specimens, most of them males, the frontal plate is quite enormous, very long and extremely broad, covering almost totally the eye-stalks; while the rostrum is very short, the plate has the front margin semicircular, and its surface is somewhat vaulted above each eye-stalk. Some other specimens show the frontal plate and the rostrum intermediate in size and shape between the two kinds of specimens mentioned; among the large number of specimens from Sta. 4619 I have found scarcely half a score showing every stage between the common form with the short and small frontal plate and a form similar to that exhibited in fig. 4a. In all other features and in the structure of the copulatory organs the specimens with the greatly expanded frontal plate agree completely with the common form. Ortmann established his *E. diomedeae* on a couple of specimens with the frontal plate exceedingly large, but according to my experience I must consider this development as an anomaly, taking

the common form as the normal. And a similar instance in another species may be mentioned for comparison. Among a good number of *Euphausia triacantha* Holt and Tattersall secured by the Swedish Antarctic Expedition I have found a single specimen, an adult female, having the frontal plate much longer and very considerably broader and the rostrum much shorter than in the other specimens, excepting one which shows in a feeble degree the development mentioned.

The keel on the upper side of third antennular joint is moderately high, rounded above on the highest point towards the distal end, and rarely with a trace of the anterior incision found in the two preceding species.

A single specimen (from Sta. 4713) is somewhat larger than all others, 18 mm. long; many specimens measure 13–14 mm. in length, but the majority of the adults only 10–12 mm.

Distribution.— The species is unknown from the Atlantic. The Copenhagen Museum possesses specimens from a dozen localities, viz.: — The Red Sea, from Lat. 8° 1′ S., long. 83° 51′ E.; West of Cape Comorin; the Bay of Bengal, and in the South Chinese Sea eastwards and northwards to Lat. 19° 14′ N., long. 116° 16′ E.; it is common in the East Indian Archipelago ("Siboga"). Ortmann's types were taken at the Bindloe Island, Galapagos. The list shows that the species is very common in the area explored in 1904–1905 excepting in the southeastern part (from Sta. 4666 to Sta. 4705) and the southwestern part (from Sta. 4733 to Sta. 4741) where it was entirely absent.

The very long list of localities from the Agassiz Expedition shows that this species has frequently been taken at the surface, sometimes even in large numbers. The Copenhagen material has certainly all been taken near the surface.

15. **Euphausia mutica** H. J. Hansen.

1905. *Euphausia mutica* H. J. Hansen, Bull. Mus. Océan. Monaco, no. 42, p. 14 (partim).
1910. *Euphausia mutica* H. J. Hansen, Siboga-Exp., **37**, p. 93, pl. 19, figs. 1a–1d.

Sta. 4678. Dec. 6, 1904. Lat. 16° 31.2′ S., long. 85° 3.8′ W. Surface. 1 specimen.
Sta. 4679. Dec. 7, 1904. Lat. 17° 26.4′ S., long. 86° 46.5′ W. 300 fms. to surface. 3 specimens.
Sta. 4681. Dec. 8, 1904. Lat. 18° 47.1′ S., long. 89° 26′ W. 300 fms. to surface. 21 specimens.
Sta. 4682. Dec. 8, 1904. Lat. 19° 7.6′ S., long. 90° 10.6′ W. Surface. 11 specimens.
Sta. 4683. Dec. 9, 1904. Lat. 20° 2.4′ S., long. 91° 52.5′ W. 300 fms. to surface. 5 specimens.
Sta. 4700. Dec. 25, 1904. Lat. 20° 28.8′ S., long. 103° 26.3′ W. Surface. 1 specimen.
Sta. 4701. Dec. 26, 1904. Lat. 19° 11.5′ S., long. 102° 24′ W. 300 fms. to surface. 1 specimen.
Sta. 4702. Dec. 26, 1904. Lat. 18° 39.5′ S., long. 102° W. Surface. 2 specimens.
Sta. 4703. Dec. 27, 1904. Lat. 17° 18.6′ S., long. 100° 52.3′ W. 300 fms. to surface. 2 specimens.
Sta. 4704. Dec. 27, 1904 Lat. 16° 55.3′ S., long. 100° 24.6′ W. Surface. 28 specimens.
Sta. 4705. Dec. 28, 1904. Lat. 15° 5.3′ S., long. 99° 19′ W. 300 fms. to surface. 8 specimens.
Sta. 4706. Dec. 28, 1904. Lat. 14° 18.7′ S., long. 98° 45.8′ W. Surface. 13 specimens.
Sta. 4723. Jan. 16, 1905. Lat. 10° 14.3′ S., long. 107° 15.5′ W. Surface. 2 specimens.

Sta. 4724. Jan. 18, 1905. Lat. 11° 13.4′ S., long. 109° 39′ W. 300 fms. to surface. 13 specimens.
Sta. 4725. Jan. 17, 1905. Lat. 11° 38.3′ S., long. 110° 5′ W. Surface. 4 specimens.
Sta. 4727. Jan. 18, 1905. Lat. 13° 3′ S., long. 112° 44.9′ W. Surface. 10 specimens.
Sta. 4728. Jan. 19, 1905. Lat. 13° 47.5′ S., long. 114° 21.6′ W. 300 fms. to surface. 27 specimens.
Sta. 4729. Jan. 19, 1905. Lat. 14° 15′ S., long. 115° 13′ W. Surface. 13 specimens.
Sta. 4730. Jan. 20, 1905. Lat. 15° 7′ S., long. 117° 1.2′ W. 300 fms. to surface. 19 specimens.
Sta. 4731. Jan. 20, 1905. Lat. 15° 47.2′ S., long. 118° 22.5′ W. Surface. 4 specimens.
Sta. 4732. Jan. 21, 1905. Lat. 16° 32.5′ S., long. 119° 59′ W. 300 fms. to surface. 2 specimens.
Sta. 4733. Jan. 21, 1905. Lat. 16° 57.4′ S., long. 120° 48′ W. Surface. 7 specimens.
Sta. 4734. Jan. 22, 1905. Lat. 17° 36′ S., long. 122° 35.6′ W. 300 fms. to surface. 2 specimens.
Sta. 4735. Jan. 22, 1905. Lat. 18° 16′ S., long. 123° 34.4′ W. Surface. 6 specimens.
Sta. 4736. Jan. 23, 1905. Lat. 19° 0.4′ S., long. 125° 5.4′ W. 300 fms. to surface. 2 specimens.

Finally from the following Station:—

Hyd. Sta. 3998 (236). Jan. 28, 1900. Lat. 6° 34′ N., long. 170° 59 E. Surface. Electric light. 6 specimens. "Albatross."

Remarks.— To the description in the "Siboga" paper may be added, that the dorsal keel on the third antennular joint is medium sized, with its feebly rounded distal angle about 100° and the front margin subvertical or distinctly oblique.

One of the largest specimens measures 13 mm. in length; most of the adults are about 10–12 mm., sometimes even only 8–9 mm.

Distribution.— This species is more widely distributed than the allied *E. diomedeae*, but the number of specimens seen by me of *E. mutica* is yet much smaller than the number of the other species. In the tropical East Pacific the two species were seldom taken together or at localities near each other, *E. mutica* being restricted to the southern part of the area explored, not being found North of Lat. 10° 14′ S., while in the major portion of this southern part *E. diomedeae* was entirely wanting.— *E. mutica* has been taken by the Prince of Monaco in the Sargasso Sea at Sta. 137 and Sta. 142 (West of Long. 40° W., South of Lat. 42° N.) and the Copenhagen Museum possesses specimens from the following places in the Atlantic:— Lat. 39° 30′ N., long. 50° W.; Lat. 33° N., long. 47° W.; Lat. 24° N., long. 22° W.; the West Indies; the Guinea current, finally Lat. 38° S., long. 12° E. Furthermore the Copenhagen Museum possesses specimens from the Indian Ocean about at Lat. 23° S., long. 81½° E., from the South Chinese Sea: Lat. 19° 14′ N., long. 116° 6′ E., and from Japan: Lat. 31° 20′ N., long. 132° 29′ E. The "Siboga" captured some specimens at two Stations in the Indian Archipelago.— The species has very frequently been taken at the surface.

16. **Euphausia brevis** H. J. Hansen.

Plate 8, figs. 1a–1g.

1905. *Euphausia brevis* H. J. Hansen, Bull. Mus. Océan. Monaco, no. 42, p. 15.

Sta. 4685. Dec. 10, 1904. Lat. 21° 36.2′ S., long. 94° 56′ W. 300 fms. to surface. 13 specimens.
Sta. 4686. Dec. 10, 1904. Lat. 22° 2′ S., long. 95° 52′ W. Surface. 31 specimens.
Sta. 4687. Dec. 11, 1904. Lat. 22° 49.5′ S., long. 97° 30.6′ W. { 300 fms. to surface. 16 specimens. / 2125 fms. to surface. 7 specimens.
Sta. 4688. Dec. 11, 1904. Lat. 23° 17.2′ S., long. 98° 37.5′ W. Surface. 7 specimens.
Sta. 4689. Dec. 12, 1904. Lat. 24° 5′ S., long. 100° 20′ W. 300 fms. to surface. 21 specimens.
Sta. 4690. Dec. 12, 1904. Lat. 24° 45′ S., long. 101° 45′ W. Surface. 11 specimens.
Sta. 4691. Dec. 13, 1904. Lat. 25° 27.3′ S., long. 103° 29.3′ W. 300 fms. to surface. 17 specimens.
Sta. 4692. Dec. 13, 1904. Lat. 25° 40.4′ S., long. 104° 1.3′ W. Surface. 1 specimen.
Sta. 4694. Dec. 22, 1904. Lat. 26° 31′ S., long. 108° 57.3′ W. Surface. 11 specimens.
Sta. 4695. Dec. 23, 1904. Lat. 25° 22.4′ S., long. 107° 45′ W. 300 fms. to surface. 1 specimens.
Sta. 4696. Dec. 23, 1904. Lat. 24° 40.3′ S., long. 107° 5.3′ W. Surface. 1 specimen.
Sta. 4698. Dec. 24, 1904. Lat. 22° 50.4′ S., long. 105° 31.7′ W. Surface. 10 specimens.
Sta. 4699. Dec. 25, 1904. Lat. 21° 39.5′ S., long. 104° 29.8′ W. 300 fms. to surface. 2 specimens.
Sta. 4700. Dec. 25, 1904. Lat. 20° 28.8′ S., long. 103° 26.3′ W. Surface. 9 specimens.
Sta. 4701. Dec. 26, 1904. Lat. 19° 11.5′ S., long. 102° 24′ W. 300 fms. to surface. 1 specimen.
Sta. 4702. Dec. 26, 1904. Lat. 18° 39.5′ S., long. 102° W. Surface. 11 specimens.
Sta. 4730. Jan. 20, 1905. Lat. 15° 7′ S., long. 117° 1.2′ W. 300 fms. to surface. 3 specimens.
Sta. 4734. Jan. 22, 1905. Lat. 17° 36′ S., long. 122° 35.6′ W. 300 fms. to surface. 1 specimen.
Sta. 4735. Jan. 22, 1905. Lat. 18° 16′ S., long. 123° 34.4′ W. Surface. 33 specimens.
Sta. 4736. Jan. 23, 1905. Lat. 19° 04′ S., long. 125° 5.1′ W. 300 fms. to surface. 10 specimens.
Sta. 4738. Jan. 24, 1905. Lat. 20° 26.5′ S., long. 128° 30.2′ W. Surface. 21 specimens.

Description.— The frontal plate is broad and moderately long (fig. 1a), proportionately broader and conspicuously longer than in the four preceding species, with the lateral margins nearly straight or feebly sinuate, terminating in a small or very small, very oblong-triangular rostrum somewhat or much shorter than the breadth of second antennular joint. The median area behind the frontal plate is much vaulted; the keel from the basal part of the rostrum to the hind margin of the area named is well developed.

Eyes very distinctly smaller than in *E. eximia*, brown or blackish brown, thus lighter than in the four preceding species.— The antennular pedunceles comparatively thick, similar in both sexes. The first joint distinctly less than twice as long as broad; its terminal lobe is directed vertically upwards or upwards and somewhat forwards, it is about half as broad as the end of the joint, broader than high, with the terminal margin more or less deeply and obliquely concave, the distal inner part being triangular, somewhat produced and its angle terminating in an acute point or short, spiniform process, while its outer distal angle is produced into a somewhat longer, subspiniform process (fig. 1c); frequently the concave distal margin shows a tiny, angular projection usually terminating in a short seta. Second peduncular joint with a proportionately rather long, spiniform process originating above from the distal margin somewhat inside

the outer margin and directed forwards and a little outwards (fig. 1c), while there is no trace of any corresponding distal process or tubercle above near the inner margin. Third joint slightly longer than second; its dorsal keel only half as long as the joint, seen from above less sharp (fig. 1a) and seen from the side only moderately high (fig. 1b), very obliquely triangular, with the distal upper angle obtuse.— The antennal squama reaches nearly or not fully the middle of third antennular joint and is proportionately broader than in *E. recurva* or *E. eximia*; the spiniform process from the subbasal joint reaches the middle of the squama.

The copulatory organs (figs. 1d–1g) are somewhat similar to those of *E. eximia*, but all three processes are proportionately shorter and show besides minor differences. The terminal process has its distal part shorter and much less curved (fig. 1g), with its spiniform appendage rather short. The proximal process is considerably shorter and proximally more inflated (fig. 1e) and beyond the middle more curved than in *E. eximia*; its distal fourth is an oblong, at the end, rounded plate (fig. 1f) bent considerably backwards, and at its base a narrowly triangular protuberance projects forwards; the real length of this plate is shown by fig. 1e, while fig. 1f exhibits the inner lobe with its two processes seen from the inner side, and owing to the very oblique direction of the terminal plate of the proximal process that plate looks in this figure much shorter than in the lateral view. The lateral process has its curved part shorter than in *E. eximia*, but as in this species without any dorsal teeth. The auxiliary lobe is moderately long; the obliquely triangular terminal part of the setiferous lobe is somewhat more produced than in *E. eximia*.

Length of adult specimens 8.5–10 mm.

Remarks.— *E. brevis* is easily distinguished from the other species of this group by its longer frontal plate with the rostrum short, by the shape of the lobe of first antennular joint and especially by having above on the second antennular joint a most conspicuous, slender process near the distal outer angle but no trace of any process or tubercle at the inner angle.

Distribution.— The distribution of *E. brevis* differs very little from that of *E. mutica*. In the tropical East Pacific it is confined to a still smaller southern area than *E. mutica* as it was not found North of Lat. 15° 7′ S., and the majority of the Stations are South of Lat. 20° S.— It is not known from near the Western coast of Europe, but the Prince of Monaco has captured it in the Sargasso Sea in Lat. $40\frac{3}{4}°$—$41\frac{2}{3}°$ N., long. 40°–$41\frac{2}{3}°$ W., and several times in the triangle, the "Banc de Goringe," the Azores, and the Canary Islands; besides in the Medi-

terranean. The Copenhagen Museum possesses specimens from four localities in the North Atlantic: — Lat. 37° N., long. 41° W.; Lat. 33° N., long. 47° W.; Lat. 24° N., long. 22° W., and Lat. 23° 31′ N., long. 22° 4′ W.; furthermore from one place in the South Atlantic: — Lat. 22½° S., long. 29½° W., from one in the Southern part of the Indian Ocean about at Lat. 23° S., long. 81½° E., finally from a place at Japan: — Lat. 31° 20′ S., long. 132° 29′ E. — Most of the specimens recorded have been taken at the surface.

Group b. *Species with a single pair of lateral denticles on the carapace. No dorsal process on third to fifth abdominal segment.*

17. **Euphausia pacifica** H. J. Hansen.

Plate 7, figs. 5a–5b.

1911. *Euphausia pacifica* H. J. Hansen, Bull. Mus. Océan. Monaco, no. 210, p. 28 (with two figures in the text).

Sta. 4571. Oct. 7, 1904. Lat. 33° 40′ N., long. 119° 35′ W. { 4 fms., surface net. 1 immature specimen. / 300 fms. to surface. 28 immature specimens.

Description.— The frontal plate is extremely short, without any real rostral process, but at the middle feebly produced as a triangle several times broader than long, with the vertex in the adults generally rounded, rarely acute, in immature specimens rounded or acute.

The eyes are extremely large; the distal joint of the stalks short. — The antennular peduncles are somewhat long, more slender in immature specimens (fig. 5a) than in adults; lobe of first joint is in the adults a small, oblong-triangular, acuminate, and acute process; in specimens a little more than half grown it is somewhat shorter in proportion to breadth (fig. 5b). Second joint is distinctly longer than the third, with the inner distal angle on the upper surface a little produced, acute.

The copulatory organs afford excellent specific characters, but as all specimens in the Agassiz collection are far from adult I have not figured these organs; in the recently published description of this species, quoted above, I have given a preliminary representation of the organs and may now refer to that paper.

One of the largest specimens in the Agassiz collection is only a little more than half-grown and measures 11 mm. in length, while adults are generally 18–22 mm. long.

Remarks.— This species is closely allied and similar to *E. lucens* H. J. H. (= *E. splendens* sens. G. O. S.), but it is well distinguished by a few small char-

acters and especially by the copulatory organs. The antennular peduncles are a little longer and distinctly more slender than in *E. lucens*, with the second joint longer than the third, while in *E. lucens* it is not longer than the third; finally the lobe of first joint is a little less conspicuous than in *E. lucens* and differs slightly in shape. The rostrum, viz. the triangle at the middle of the front margin of the carapace, is generally more pronounced and more produced in *E. lucens* than in *E. pacifica*. And the copulatory organs afford excellent characters, but here I will only refer to the brief descriptions with figures of the most important parts of the copulatory organs of *E. pacifica*, *E. lucens*, and a third closely allied species, *E. frigida* H. J. H., found in my above-mentioned paper.

Distribution.— The species is distributed in the temperate and boreal North Pacific; it is very common at Japan. The Copenhagen Museum possesses considerable material from seven localities at Formosa and especially from near Japan and Corea northwards to Lat. 39° N.; a future report on the fine material belonging to the U. S. Nat. Museum will contain a fuller account of its distribution. But here it may be stated that the specimens from four localities in the North Pacific — between Lat. 35° 19½′ N. and Lat. 35° 36½′ N., long. 125° 21½′ W. and 124° 45½′ W. — referred by Ortmann (in his paper in 1894) to *Euphausia splendens* Dana belong to *E. pacifica*.

18. **Euphausia tenera** H. J. Hansen.

1885. *Euphausia gracilis* G. O. Sars, Challenger Rept., **13**, p. 89, pl. 15, figs. 12–23 (not *E. gracilis* Dana).
1905. *Euphausia tenera* H. J. Hansen, Bull. Mus. Océan. Monaco, no. 42, p. 9.
1910. *Euphausia tenera* H. J. Hansen, Siboga-Exp., **37**, p. 95, pl. 14, figs. 3a–3e.

Sta. 4587.	Oct. 12, 1904.	Lat. 20° 42′ N., long. 107° 25′ W.	300 fms. to surface. 7 specimens.
Sta. 4588.	Oct. 12, 1904.	Lat. 19° 52′ N., long. 106° 22′ W.	Surface. 59 specimens.
Sta. 4596.	Oct. 14, 1904.	Lat. 16° 47′ N., long. 100° 27′ W.	Surface. 5 specimens.
Sta. 4598.	Oct. 15, 1904.	Lat. 15° 58′ N., long. 98° 13′ W.	300 fms. to surface. 1 specimen.
Sta. 4619.	Oct. 20, 1904.	Lat. 7° 15′ N., long. 82° 8′ W.	Surface. 1 specimen.
Sta. 4634.	Nov. 4, 1904.	Lat. 4° 35.4′ N., long. 83° 32.3′ W.	300 fms. to surface. 1 specimen.
Sta. 4635.	Nov. 4, 1904.	Lat. 3° 52.5′ N., long. 84° 14.3′ W.	Surface. 5 specimens.
Sta. 4637.	Nov. 5, 1904.	Lat. 1° 31′ N., long. 86° 32′ W.	300 fms. to surface. 27 specimens.
Sta. 4638.	Nov. 6, 1904.	Lat. 0° 27′ N., long. 87° 13′ W.	300 fms. to surface. 21 specimens.
Sta. 4640.	Nov. 6, 1904.	Lat. 0° 39.4′ S., long. 88° 11′ W.	Surface. 134 specimens.
Sta. 4644.	Nov. 7, 1904.	Lat. 2° 13.3′ S., long. 89° 42.2′ W.	Surface. 22 specimens.
Sta. 4646.	Nov. 8, 1904.	Lat. 4° 1.6′ S., long. 89° 16.3′ W.	Surface. 87 specimens. 300 fms. to surface. 14 specimens.
Sta. 4648.	Nov. 9, 1904.	Lat. 4° 43′ S., long. 87° 7.5′ W.	Surface. 10 specimens.
Sta. 4649.	Nov. 10, 1904.	Lat. 5° 17′ S., long. 85° 19.5′ W.	300 fms. to surface. 1 specimen.
Sta. 4650.	Nov. 10, 1904.	Lat. 5° 22′ S., long. 84° 39′ W.	300 fms. to surface. 11 specimens.
Sta. 4652.	Nov. 11, 1904.	Lat. 5° 44.7′ S., long. 82° 39.5′ W.	Surface. 5 specimens. 200 fms. to surface. 1 specimen.
Sta. 4657.	Nov. 13, 1904.	Lat. 7° 12.5′ S., long. 84° 9′ W.	300 fms. to surface. 4 specimens.
Sta. 4659.	Nov. 14, 1904.	Lat. 8° 54.5′ S., long. 86° 5.5′ W.	Surface. 2 specimens. 300 fms. to surface. 4 specimens.

Sta. 4661. Nov. 15, 1904. Lat. 10° 17′ S., long. 88° 2′ W. { Surface. 1 specimen. / 300 fms. to surface. 9 specimens.
Sta. 4663. Nov. 16, 1904. Lat. 11° 20.3′ S., long. 88° 55.2′ W. 300 fms. to surface. 14 specimens.
Sta. 4664. Nov. 17, 1904. Lat. 11° 30.3′ S., long. 87° 19′ W. 300 fms. to surface. 1 specimen.
Sta. 4665. Nov. 17, 1904. Lat. 11° 45′ S., long. 86° 5.2′ W. 300 fms. to surface. 64 specimens.
Sta. 4667. Nov. 18, 1904. Lat. 11° 59.5′ S., long. 83° 40.1′ W. { Surface. 1 specimen. / 300 fms. to surface. 3 specimens.
Sta. 4668. Nov. 19, 1904. Lat. 12° 9.3′ S., long. 81° 45.2′ W. Open part of Tanner net: 300 fms. to surface. 10 specimens.
Sta. 4669. Nov. 19, 1904. Lat. 12° 12.7′ S., long. 80° 25.6′ W. { Surface. 1 specimen. / 300 fms. to surface. 25 specimens.
Sta. 4671. Nov. 20, 1904. Lat. 12° 6.9′ S., long. 78° 28.2′ W. 300 fms. to surface. 6 specimens.
Sta. 4673. Nov. 21, 1904. Lat. 12° 30.5′ S., long. 77° 49.4′ W. 300 fms. to surface. 2 specimens.
Sta. 4676. Dec. 5, 1904. Lat. 14° 28.9′ S., long. 81° 24′ W. 300 fms. to surface. 2 specimens.
Sta. 4678. Dec. 6, 1904. Lat. 16° 31.2′ S., long. 85° 3.8′ W. Surface. 20 specimens.
Sta. 4679. Dec. 7, 1904. Lat. 17° 26.1′ S., long. 86° 46.5′ W. 300 fms. to surface. 10 specimens.
Sta. 4680. Dec. 7, 1904. Lat. 17° 55′ S., long. 87° 42′ W. Surface. 8 specimens.
Sta. 4681. Dec. 8, 1904. Lat. 18° 47.1′ S., long. 89° 26′ W. 300 fms. to surface. 13 specimens.
Sta. 4683. Dec. 9, 1904. Lat. 20° 2.4′ S., long. 91° 52.5′ W. 300 fms. to surface. 4 specimens.
Sta. 4701. Dec. 26, 1904. Lat. 19° 11.5′ S., long. 102° 24′ W. 300 fms. to surface. 1 specimen.
Sta. 4702. Dec. 26, 1904. Lat. 18° 39.5′ S., long. 102° W. Surface. 1 specimen.
Sta. 4705 Dec. 28, 1904. Lat. 15° 5.3′ S., long. 99° 19′ W. 300 fms. to surface. 2 specimens.
Sta. 4706. Dec. 28, 1901. Lat. 14° 18.7′ S., long. 98° 45.8′ W. Surface. 1 specimen.
Sta. 4707. Dec. 29, 1901. Lat. 12° 33.2′ S., long. 97° 42′ W. 300 fms. to surface. 2 specimens.
Sta. 4708. Dec. 29, 1904. Lat. 11° 40′ S., long. 96° 55′ W. Surface. 4 specimens.
Sta. 4709. Dec. 30, 1901. Lat. 10° 15.2′ S., long. 95° 45.8′ W. 300 fms. to surface. 4 specimens.
Sta. 4710. Dec. 30, 1901. Lat. 9° 30.5′ S., long. 95° 8.3′ W. Surface. 2 specimens.
Sta. 4712. Dec. 31, 1901. Lat. 7° 5′ S., long. 93° 35.5′ W. Surface. 1 specimen.
Sta. 4713. Jan. 1, 1905. Lat. 5° 35.3′ S., long. 92° 21.6′ W. 300 fms. to surface. 4 specimens.
Sta. 4714. Jan. 1, 1905. Lat. 4° 19′ S., long. 91° 28.5′ W. Surface. 23 specimens.
Sta. 4716. Jan. 2, 1905. Lat. 2° 18.5′ S., long. 90° 2.6′ W. Surface. 25 specimens.
Sta. 4717. Jan. 13, 1905. Lat. 5° 10′ S., long. 98° 56′ W. 300 fms. to surface. 1 specimen.
Sta. 4721. Jan. 15, 1905. Lat. 8° 7.5′ S., long. 104° 10.5′ W. 300 fms. to surface. 1 specimen.
Sta. 4722. Jan. 16, 1905. Lat. 9° 31′ S., long. 106° 30.5′ W. 300 fms. to surface. 3 specimens.
Sta. 4723. Jan. 16, 1905. Lat. 10° 14.3′ S., long. 107° 45.5′ W. Surface. 5 specimens.
Sta. 4724. Jan. 17, 1905. Lat. 11° 13.4′ S., long. 109° 39′ W. 300 fms. to surface. 103 specimens.
Sta. 4725. Jan. 17, 1905. Lat. 11° 38.3′ S., long. 110° 5′ W. Surface. 1 specimen.
Sta. 4728. Jan. 19, 1905. Lat. 13° 47.5′ S., long. 114° 26.1′ W. 300 fms. to surface. 11 specimens.
Sta. 4730. Jan. 20, 1905. Lat. 15° 7′ S., long. 117° 1.2′ W. 300 fms. to surface. 7 specimens.
Sta. 4732. Jan. 21, 1905. Lat. 16° 32.5′ S., long. 119° 59′ W. 300 fms. to surface. 1 specimen.
Sta. 4733. Jan. 21, 1905. Lat. 16° 57.4′ S., long. 120° 48′ W. Surface. 1 specimen.
Sta. 4734. Jan. 22, 1905. Lat. 17° 36′ S., long. 122° 35.6′ W. 300 fms. to surface. 52 specimens.
Sta. 4735. Jan. 22, 1905. Lat. 18° 16′ S., long. 123° 34.4′ W. Surface. 4 specimens.
Sta. 4736. Jan. 23, 1905. Lat. 19° 0.4′ S., long. 125° 5.4′ W. 300 fms. to surface. 20 specimens.
Sta. 4740. Feb. 11, 1905. Lat. 9° 2.1′ S., long. 123° 20.1′ W. 300 fms. to surface. 12 specimens (7 of which are larvae).
Sta. 4741. Feb. 11, 1905. Lat. 8° 29.7′ S., long. 122° 56′ W. Surface. 12 specimens.
Sta. 4743. Feb. 20, 1905. Lat. 8° 52.2′ N., long. 108° 51′ W. Surface. 2 specimens.

Furthermore the species was taken by an earlier expedition at two places: —

Hyd. Sta. 3789. Sept. 9, 1899. Lat. 2° 38′ N., long. 137° 22′ W. Surface. 4 specimens. "Albatross."
Hyd. Sta. 3998 (236). Jan. 28, 1900. Lat. 6° 34′ N., long. 170° 59′ E. Surface. Electric light. 2 specimens. "Albatross."

The representation given by Sars together with the additional notes and figures in the "Siboga" Report may convey a sufficient idea of this small and very slender species.

Distribution.— The long list of Stations shows that this species is extremely common in the major part of the area investigated, viz. in its most tropical belt, being entirely wanting in the portions South of Lat. 20° S. and North of Lat. 20° 42′ N. According to Sars it has once been taken rather southwards, viz. off Port Jackson, about at Lat. 33½° S. It is common in the Indian Archipelago ("Challenger," "Siboga") and the Copenhagen Museum possesses a specimen from the Southern Chinese Sea at Lat. 19° 14′ N., long. 116° 16′ E. Finally it is common in the tropical Atlantic, going northwards at least to Lat. 24° N. (Ortmann, and specimens in the Copenhagen Museum from almost twenty localities).

The species has frequently been taken at the surface. But it may be mentioned that according to Ortmann the German Plankton-Expedition has captured the species twice in the closing net from 1200 to 1000 m. and from 700 to 500 m., thus proving that at least sometimes it goes down to a very considerable depth.

Group c. *Species with a single pair of lateral denticles on the carapace. A protruding, acute dorsal process on third abdominal segment but without any dorsal process — at most with a minute denticle (E. mucronata) — on fourth and fifth abdominal segments.*

19. **Euphausia gibba** G. O. Sars.

Plate 8, figs. 2a–2b.

1883. *Euphausia gibba* G. O. Sars, Forh. Vid. Selsk. Christiania for 1883, no. 7, p. 17.
1885. *Euphausia gibba* G. O. Sars, Challenger Rept., **13**, p. 91, pl. 16, figs. 1–8.
1911. *Euphausia gibba* H. J. Hansen, Bull. Mus. Océan. Monaco, no. 210, p. 31. (With figure).

Sta. 4683.	Dec. 9, 1904.	Lat. 20° 2.4′ S., long. 91° 52.5′ W.	300 fms. to surface. 7 specimens.
Sta. 4685.	Dec. 10, 1904.	Lat. 21° 36.2′ S., long. 94° 56′ W.	300 fms. to surface. 2 specimens.
Sta. 4686.	Dec. 10, 1904.	Lat. 22° 2.2′ S., long. 95° 52′ W.	Surface. 1 specimen.
Sta. 4687.	Dec. 11, 1904.	Lat. 22° 49.5′ S., long. 97° 30.6′ W.	300 fms. to surface. 6 specimens. 2125 fms. to surface. 1 specimen.
Sta. 4695.	Dec. 23, 1904.	Lat. 25° 22.4′ S., long. 107° 45′ W.	300 fms. to surface. 1 specimen.
Sta. 4696.	Dec. 23, 1904.	Lat. 24° 40.3′ S., long. 107° 5.3′ W.	Surface. 5 specimens.
Sta. 4698.	Dec. 24, 1904.	Lat. 22° 50.4′ S., long. 105° 31.7′ W.	Surface. 14 specimens.
Sta. 4700.	Dec. 25, 1904.	Lat. 20° 28.8′ S., long. 103° 26.3′ W.	Surface. 1 specimen.
Sta. 4701.	Dec. 26, 1904.	Lat. 19° 11.5′ S., long. 102° 24′ W.	300 fms. to surface. 12 specimens.
Sta. 4702.	Dec. 26, 1904.	Lat. 18° 39.5′ S., long. 102° W.	Surface. 7 specimens.
Sta. 4704.	Dec. 27, 1904.	Lat. 16° 55.3′ S., long. 100° 24.6′ W.	300 fms. to surface. 2 specimens.
Sta. 4732.	Jan. 21, 1905.	Lat. 16° 32.5′ S., long. 119° 59′ W.	300 fms. to surface. 1 specimen.
Sta. 4735.	Jan. 22, 1905.	Lat. 18° 16′ S., long. 123° 34.4′ W.	Surface. 2 specimens.

Description.— Body slender.— Frontal plate very short, rostrum oblong-triangular, somewhat acuminate and very acute, about as long as, or a little longer than, the breadth of the second antennular joint and not quite or about

as long as the diameter of the small eyes; the gastric area, seen from the side, somewhat feebly vaulted, and the median keel is well developed.

Lobe from first antennular joint not half as broad as the end of the joint, directed obliquely forwards, upwards, and somewhat outwards; not quite as long as broad, somewhat oblique-triangular with the inner margin feebly convex; the end very acute, and besides frequently with an extremely low tooth or feebly produced, sharp angle near the base of the outer side. Second antennular joint above with the distal inner angle showing an extremely small, sharp tooth; while at the outer side the lateral corner itself is rounded. Third joint, seen from the outer side (fig. 2a), with the dorsal keel decreasing gradually in height from the middle to its proximal end which is situated at some distance from the end of second joint, thus nearly as in *E. paragibba* H. J. H., but the distal part of the keel is a little higher than in the latter species.

Dorsal process of third abdominal segment, seen from above, shaped as an oblong-triangular, distally acuminate and acute plate, very far from half as long as the fourth segment. Sixth abdominal segment as in *E. paragibba*.

The copulatory organs (fig. 2b) differ extremely from those in all other species of the genus. The terminal process (p^2.) is unusually small, subconical, thick at the base, and with the distal third slender, acute and suddenly bent obliquely forwards and outwards; the heel is proportionately long and very slender. The proximal process (p^3.) is very long and strong, thickened at the base and then tapering nearly evenly to the acute end; somewhat before its middle it is curved somewhat inwards; and somewhat beyond the middle it is bent considerably outwards and besides forwards, its distal third being almost straight. The lateral process (p^4.) is bent strongly inwards a little before the middle; its proximal part is thick, its distal part slender, and it has no dorsal tooth. The median lobe is very curious; its proximal third, to the insertion of the lateral process, is extremely broad, its middle third is considerably narrower, yet broader than long; the distal third originates from the outer distal angle of the preceding part as a kind of thin-skinned, very slender finger with the proximal half directed considerably outwards and the distal part bent conspicuously inwards. The auxiliary lobe of moderate length; the setiferous lobe as in allied species, with seven setae along its triangularly produced terminal margin.

Length of adults of both sexes 11–15 mm., most frequently 12–13.5 mm.

Remarks.— *E. gibba* G. O. S. is closely allied and very similar to *E. pseudogibba* Ortm., *E. hemigibba* H. J. H., and *E. paragibba* H. J. H. These four species are in reality so similar in general aspect, in shape of rostrum, size of eyes, lobe

of first antennular joint, etc., that a close examination is necessary in order to separate them with certainty. As pointed out in the "Siboga" Report, the male copulatory organs of first pleopods afford excellent specific characters, and it may be added that these organs in *E. gibba* differ strongly from those in the three species mentioned by the very short and curiously shaped terminal process, the very long and strong proximal process and the finger-shaped, very slender and feebly chitinized terminal part of the median lobe. The female is very similar to that of *E. paragibba*, the only difference being that the distal part of the keel on the third antennular joint is a little higher and less rounded than in the latter species. Furthermore *E. gibba* is generally smaller than *E. paragibba* and differs in all probability in the living state by the colour of the body; the Agassiz collection contains specimens of both species from a good number of localities, and while the specimens of *E. paragibba* are whitish or a little yellowish, those of *E. gibba* are less or more yellowish or sometimes light brownish or even somewhat saffron coloured.

It is seen from the "Challenger" localities that Sars has confused at least two species, because *E. gibba* does not occur in the Atlantic. He has marked a specimen from the West Pacific, between Api and Cape York, as type, and his fig. 6 on Pl. XVI shows that he has examined and figured a male of the species described here as *E. gibba*.

Distribution.— The list of localities shows that *E. gibba* was taken only in the southern parts of the area investigated, viz. only South of Lat. 16° 32′ S. The Copenhagen Museum possesses two specimens from the South Pacific at Lat. 27° 11′ S., long. 88° 52′ W. ("Galathea" Exp.), and the type of Sars was, as already stated, taken between Api and Cape York. Sars states that he has seen specimens of *E. gibba* taken off Kandavu, Fiji Islands, and during my visit to London in 1907, I separated three of his thirteen specimens as being *E. tenera*, but not having at that time discovered the importance of the copulatory organs, and that therefore new species ought to be separated from the original *E. gibba* material, I cannot state anything concerning the remaining ten specimens.

But all statements in the literature as to the occurrence of *E. gibba* in the Atlantic and the Indian Ocean are to be cancelled, as all the specimens re-examined by me belong to *E. hemigibba* H. J. H., *E. pseudogibba* Ortm., or *E. paragibba* H. J. H.

20. **Euphausia paragibba** H. J. Hansen.

1910. *Euphausia paragibba* H. J. Hansen, Siboga-Exp., **37**, p. 100, pl. 14, figs. 6a–6d.

Sta. 4679. Dec. 7, 1904. Lat. 17° 26.4′ S., long. 86° 46.5′ W. 300 fms. to surface. 5 specimens.
Sta. 4681. Dec. 8, 1904. Lat. 18° 47.1′ S., long. 89° 26′ W. 300 fms. to surface. 7 specimens.

Sta. 4705. Dec. 28, 1904. Lat. 15° 5.3′ S., long. 99° 19′ W. 300 fms. to surface. 17 specimens.
Sta. 4707. Dec. 29, 1904. Lat. 12° 32.2′ S., long. 97° 42′ W. 300 fms. to surface. 2 specimens.
Sta. 4709. Dec. 30, 1904. Lat. 10° 15.2′ S., long. 95° 40.8′ W. 300 fms. to surface. 5 specimens.
Sta. 4721. Jan. 15, 1905. Lat. 8° 7.5′ S., long. 104° 10.5′ W. 300 fms. to surface. 1 specimen.
Sta. 4722. Jan. 16, 1905. Lat. 9° 31′ S., long. 106° 30.5′ W. 300 fms. to surface. 8 specimens.
Sta. 4730. Jan. 20, 1905. Lat. 15° 7′ S., long. 117° 1.2′ W. 300 fms. to surface. 1 specimen.
Sta. 4740. Feb. 11, 1905. Lat. 9° 2.1′ S., long. 123° 20.1′ W. 300 fms. to surface. 2 specimens.
Sta. 4742. Feb. 15, 1905. Lat. 0° 3.4′ N., long. 117° 15.8′ W. 300 fms. to surface. 1 specimen.

One of the largest specimens, a female, measures 17 mm., a very small adult male is scarcely 12 mm. long, but the most common size is 15–15.5 mm.

Distribution.— This species has been established on a few specimens taken in the Indian Archipelago, at Lat. 0° 17.6′ S., long. 129° 14.5′ E. The Copenhagen Museum possesses males from two localities, viz. Lat. 13° S., long. 103° 20′ E. (Capt. Andréa) and Lat. 34° 30′ S., long. 27° 40′ E. (Capt. Hartmann), the latter being in the most western part of the Indian Ocean, East of Port Elizabeth. The list above shows that the species has been taken ten times in a transverse belt about between the line and Lat. 19° S. in the area explored by Agassiz 1904–1905, while it was not met with in the larger northern and smaller southern part. Furthermore the list seems to show that the species at least as a rule does not live at the surface, but the specimens in the Copenhagen Museum have certainly been taken near the surface and probably during night.

21. **Euphausia pseudogibba** Ortmann.

1893. *Euphausia pseudogibba* Ortmann, Ergebn. der Plankton-Exped., **2**, G., b., p. 12, taf. 1, fig. 6.
1910. *Euphausia pseudogibba* H. J. Hansen, Siboga-Exp., **37**, p. 97; pl. 14, figs. 1a–1c.

Sta. 4728. Jan. 19, 1905. Lat. 13° 17.5′ S., long. 114° 21.6′ W. 300 fms. to surface. 1 specimen.
Sta. 4732. Jan. 21, 1905. Lat. 16° 32.5′ S., long. 119° 59′ W. 300 fms. to surface. 1 specimen.

I have nothing to add to the description in the "Siboga" paper.

Distribution.— Only the two specimens recorded from the Pacific are known hitherto; Ortmann's specimens from the Hawaiian Islands referred (1905) to *E. pseudogibba* belong to *E. hemigibba* H. J. H. The Copenhagen Museum and the Monaco collection contain numerous specimens from several localities from the eastern warmer temperate and tropical Atlantic North of the line; furthermore I have seen specimens from the Bay of Bengal ("Galathea" Exp.) and from Lat. 11° 16′ S., long. 103° 50′ E. (Capt. Andréa).— The specimens from twelve localities in all in the Copenhagen Museum are nearly all males and have certainly been taken at the surface during the night.

(The fourth species of the *gibba*-group *sens. striet.*, *E. hemigibba* H. J. H. (see the "Siboga" paper) is very common in the Atlantic from Lat. 42° N. to southwest of the Cape of Good Hope, and in the Indian Ocean from Port Eliza-

beth to Long. 103° E. (the Copenhagen Museum possesses specimens from no less than forty-two localities in these Oceans), but it was taken only at a single Station in the Indian Archipelago by the "Siboga", and from the Pacific at the Hawaiian Islands, viz. the above-mentioned specimens referred by Ortmann to *E. pseudogibba*).

22. **Euphausia distinguenda** H. J. Hansen.

Plate 8, figs. 3a–3f.

1911. *Euphausia distinguenda* H. J. Hansen, Bull. Mus. Océan. Monaco, no. 210, p. 32.

Sta. 4583. Oct. 11, 1904. Lat. 22° 45′ N., long. 110° 5′ W. 300 fms. to surface. 3 specimens.
Sta. 4587. Oct. 12, 1904. Lat. 20° 42′ N., long. 107° 25′ W. 300 fms. to surface. 2 specimens.
Sta. 4588. Oct. 12, 1904. Lat. 19° 52′ N., long. 106° 22′ W. Surface. 12 specimens, all immature, the majority small or very small.
Sta. 4590. Oct. 12, 1904. Lat. 18° 50′ N., long. 104° 50′ W. 300 fms. to surface. 7 specimens.
Sta. 4592. Oct. 13, 1904. Lat. 18° 20′ N., long. 103° 40′ W. Surface. 1 small specimen.
Sta. 4594. Oct. 14, 1904. Lat. 17° 20′ N., long. 101° 32′ W. 300 fms. to surface. 10 specimens.
Sta. 4596. Oct. 14, 1904. Lat. 16° 47′ N., long. 100° 27′ W. Surface. 58 specimens, small.
Sta. 4598. Oct. 15, 1904. Lat. 15° 58′ N., long. 98° 13′ W. 300 fms. to surface. 19 specimens.
Sta. 4605. Oct. 17, 1904. Lat. 12° 21′ N., long. 92° 13′ W. 300 fms. to surface. 15 specimens.
Sta. 4613. Oct. 19, 1904. Lat. 9° 45′ N., long. 86° 20′ W. 300 fms. to surface. 1 specimen.
Sta. 4615. Oct. 19, 1904. Lat. 9° 7′ N., long. 85° 11′ W. Surface. 6 small specimens.
Sta. 4619. Oct. 20, 1904. Lat. 7° 15′ N., long. 82° 8′ W. Surface. 10 small specimens.
Sta. 4631. Nov. 4, 1904. Lat. 4° 35.4′ N., long. 83° 32.3′ W. 300 fms. to surface. 4 specimens.
Sta. 4637. Nov. 5, 1904. Lat. 4° 31′ N., long. 86° 32′ W. 300 fms. to surface. 20 specimens.
Sta. 4640. Nov. 6, 1904. Lat. 0° 39.4′ S., long. 88° 11′ W. Surface. 1 small specimen.
Sta. 4644. Nov. 7, 1904. Lat. 2° 13.3′ S., long. 89° 42.2′ W. Surface. 2 small specimens.
Sta. 4646. Nov. 8, 1904. Lat. 4° 1.6′ S., long. 89° 16.3′ W. 300 fms. to surface. 11 specimens.
Sta. 4649. Nov. 10, 1904. Lat. 5° 17′ S., long. 85° 19.5′ W. 300 fms. to surface. 9 specimens.
Sta. 4650. Nov. 10, 1904. Lat. 5° 22′ S., long. 84° 39′ W. 300 fms. to surface. 35 specimens.
Sta. 4652. Nov. 11, 1904. Lat. 5° 44.7′ S., long. 82° 39.5′ W. { 100 fms. to surface. 11 specimens. / 200 fms. to surface. 5 specimens. / 400 fms. to surface. 5 specimens.
Sta. 4657. Nov. 13, 1904. Lat. 7° 12.5′ S., long. 84° 9′ W. 300 fms. to surface. 1 specimen.
Sta. 4659. Nov. 14, 1904. Lat. 8° 54.5′ S., long. 86° 5.5′ W. 300 fms. to surface. 11 specimens.
Sta. 4661. Nov. 15, 1904. Lat. 10° 17′ S., long. 88° 2′ W. 300 fms. to surface. 1 specimen.
Sta. 4663. Nov. 16, 1904. Lat. 11° 20.3′ S., long. 88° 55.2′ W. 300 fms. to surface. 18 specimens.
Sta. 4665. Nov. 17, 1904. Lat. 11° 45′ S., long. 86° 5.2′ W. { Surface. 1 small specimen / 300 fms. to surface. 24 specimens.
Sta. 4667. Nov. 18, 1904. Lat. 11° 59.5′ S., long. 83° 10.1′ W. { Surface. 1 specimen, scarcely adult. / 300 fms. to surface. 13 specimens.
Sta. 4668. Nov. 19, 1904. Lat. 12° 9.3′ S., long. 81° 45.2′ W. Bottom of Tanner net, 300 fms. 3 specimens.
Sta. 4669. Nov. 19, 1904. Lat. 12° 12.7′ S., long. 80° 25.6′ W. 300 fms. to surface. 6 specimens.
Sta. 4671. Nov. 20, 1904. Lat. 12° 6.9′ S., long. 78° 28.2′ W. 300 fms. to surface. 5 specimens.
Sta. 4673. Nov. 21, 1904. Lat. 12° 30.5′ S., long. 77° 19.4′ W. 300 fms. to surface. 2 specimens.
Sta. 4709. Dec. 30, 1904. Lat. 10° 15.2′ S., long. 95° 40.8′ W. 300 fms. to surface. 2 specimens.
Sta. 4710. Dec. 30, 1904. Lat. 9° 30.5′ S., long. 95° 8.3′ W. Surface. 1 adult specimen.
Sta. 4713. Jan. 1, 1905. Lat. 5° 35.2′ S., long. 92° 21.6′ W. 300 fms. to surface. 3 specimens.
Sta. 4715. Jan. 2, 1905. Lat. 2° 40.4′ S., long. 90° 19.3′ W. 300 fms. to surface. 3 specimens.
Sta. 4717. Jan. 2, 1905. Lat. 5° 10′ S., long. 98° 56′ W. 300 fms. to surface. 3 specimens.

Description.— Body slender.— Frontal plate (fig. 3a) moderately short, with a portion of each lateral margin somewhat convex, anteriorly produced

in a small or nearly rudimentary, acute rostrum which is badly defined, broader or much broader than long, about half as long as the breadth of second antennular joint or even conspicuously smaller. The gastric area well developed, with the median keel, seen from the side (fig. 3b), rather high and even slightly angular.

Eyes rather small; eye-stalks a little longer in proportion to their distal breadth than in allied species and in very young specimens somewhat conspicuously long.— The antennular peduncles moderately strong; the proximal joint distally somewhat raised (fig. 3c) above the base of second joint, but the lobe may be termed rudimentary, as the terminal margin, seen from above (fig. 3d), is somewhat convex and with a small incision rather near the middle. Second joint at the upper outer distal angle with a rather short and high, oblique keel (figs. 3c and 3d, p.) directed upwards and somewhat forwards, forming almost an ear-like, rounded process; the distal upper margin of the joint from this process to the inner margin is somewhat oblique (fig. 3d). Third peduncular joint, seen from the outer side (fig. 3c), with its distal half occupied above by a high keel, highest at the middle and, if well preserved, with the distal upper angle rectangular and acute, the terminal margin a little concave and oblique.— The antennal squama is somewhat broad, less than three times as long as broad, tapering considerably towards the end so that the terminal transverse margin is short and there is no tooth from the outer angle; the spine-shaped process from the outer angle of the peduncle nearly one third as long as the squama.

First and second abdominal segments slightly produced above at the middle of the posterior margin, but this produced part is rounded, scarcely angular. Third segment posteriorly produced in a spiniform, compressed process, from one third to nearly half as long as the following segment. Fourth and fifth segments without any trace of a dorsal tooth. Sixth segment long, twice as long as deep. Preanal spine simple in both sexes.— Endopod of the uropods slightly longer than the exopod and as long as, or even a little longer than, the telson.

The copulatory organs (figs. 3e–3f) show some peculiar features. The terminal process has a rather long foot and a very long, curved heel; the portion beyond the foot is moderately short, thick at the base, tapering considerably to beyond the middle where it is curved somewhat inwards, while its distal part is slender with the end scarcely acute. The proximal process (fig. 3f, p^3.) has somewhat less than the proximal half stout and almost straight, then it bends abruptly considerably inwards and becomes rapidly thinner, being at the middle much narrower or even only half as broad as its proximal part; a little beyond the middle the inner side is almost abruptly considerably expanded, and this

expansion decreases gradually to somewhat before the end; the terminal part is curved inwards and tapers to the acute end. The median lobe is normal, terminating in a somewhat flattened, rounded lobe; the lateral process (fig. 3e) is rather robust at the base; considerably beyond the middle it is bent very strongly, both inwards and considerably in the proximal direction, and at the bending it has a very conspicuous, curved, acute dorsal (or outer) tooth and sometimes still a smaller tooth or two small teeth (fig. 3f, p^4.). The auxiliary lobe is long. The setiferous lobe is broad, with five setae from the triangularly produced terminal part and about four setae distributed along the outer margin.

Length of both sexes 10–14.5 mm.

Type.— A male from Sta. 4665; 300 fms. to surface.

Remarks.— *E. distinguenda* resembles *E. paragibba* and allied species by its slender body and rather small eyes, but it is easily distinguished by having no protruding, acute lobe from first antennular joint, by the somewhat ear-like keel at the outer angle of the second joint, and by the copulatory organs; the reduced rostrum, the high keel on the third antennular joint, and the dorsal process on third abdominal segment being compressed afford other valid but less conspicuous characters.

Distribution.— The long list of localities shows that this species is common in a large part of the area explored, viz. from Lat. $22\frac{2}{3}°$ N. to Lat. $12\frac{1}{2}°$ S., while it is wanting south of the last-named latitude, and besides it was not taken in the southwestern part of the area, west of Long. 100° and south of the line. Many of the specimens referred by Ortmann (1894) to *E. mucronata* G. O. S. belong to *E. distinguenda*. But I have not seen a specimen of this species from any other area or ocean. The list shows that the species was several times taken at the surface, but that the specimens in question were nearly all immature and generally small.

23. **Euphausia lamelligera** H. J. Hansen.

Plate 8, figs. 4a–4c; Plate 9, fig. 1a.

1911. *Euphausia lamelligera* H. J. Hansen, Bull. Mus. Océan. Monaco, no. 210, p. 32.

Sta. 4588. Oct. 12, 1904. Lat. 19° 52′ N., long. 106° 22′ W. Surface. 1 young specimen.
Sta. 4592. Oct. 13, 1904. Lat. 18° 20′ N., long. 103° 40′ W. Surface. 2 specimens.
Sta. 4605. Oct. 17, 1904. Lat. 12° 21′ N., long. 92° 13′ W. 300 fms. to surface. 4 specimens.
Sta. 4611. Oct. 18, 1904. Lat. 10° 33′ N., long. 88° 30′ W. Surface. 27 specimens.
Sta. 4613. Oct. 19, 1904. Lat. 9° 45′ N., long. 86° 20′ W. 300 fms. to surface. 1 specimen.
Sta. 4615. Oct. 19, 1904. Lat. 9° 7′ N., long. 85° 11′ W. Surface. 20 specimens.
Sta. 4619. Oct. 20, 1904. Lat. 7° 15′ N., long. 82° 8′ W. Surface. 30 specimens.
Sta. 4640. Nov. 6, 1904. Lat. 0° 39.4′ S., long. 88° 11′ W. Surface. 1 specimen.
Sta. 4648. Nov. 9, 1904. Lat. 4° 43′ S., long. 87° 7.5′ W. Surface. 1 specimen.

Sta. 4650.	Nov. 10, 1904.	Lat. 5° 22′ S., long. 84° 39′ W.	Surface. 4 specimens. 300 fms. to surface. 3 specimens.
Sta. 4652.	Nov. 11, 1904.	Lat. 5° 44.7′ S., long. 82° 39.5′ W.	Surface. 2 specimens. 100 fms. to surface. 31 specimens. 200 fms. to surface. 23 specimens. 400 fms. to surface. 15 specimens.
Sta. 4655.	Nov. 12, 1904.	Lat. 5° 57.5′ S., long. 80° 50′ W.	Surface. 2 specimens. 400 fms. to surface. 1 specimens.
Sta. 4657.	Nov. 12, 1904.	Lat. 7° 12.5′ S., long. 84° 9′ W.	Surface. 22 specimens. 300 fms. to surface. 1 specimen.
Sta. 4659.	Nov. 14, 1904.	Lat. 8° 54.5′ S., long. 86° 5.5′ W.	300 fms. to surface. 1 specimens.
Sta. 4661.	Nov. 15, 1904.	Lat. 10° 17′ S., long. 88° 2′ W.	Surface. 1 specimen.

Description.— Body slender.— The frontal plate (fig. 4a) is very short, but laterally somewhat produced with right angles, while the long front margin is almost transverse, being only feebly produced at the middle with an extremely obtuse angle, and consequently no rostrum is developed. The gastric area is highly vaulted and, seen from the side, with the upper margin angular (fig. 4b), but a real keel is not developed.

The eyes are large.— The antennular peduncles are somewhat robust; the basal joint is much raised above towards the terminal margin (fig. 4c), which is situated much above the base of second joint and produced in a moderately small lobe projecting upwards, forwards, and outwards (fig. 4d); the end of the lobe is more or less distinctly cleft. Second joint at the end furnished with a very large, movable lamella which, seen from above (fig. 4d, l.), is subtriangular, reaching almost to the inner margin, and covering the outer proximal half or still more of the upper surface of the third joint; while seen from the side (fig. 4c) its lower margin runs almost along the middle of the side of the third joint, so that the proximal upper fourth or still more of the whole outer surface of the joint is covered; in immature specimens this lamella is smaller and in about half-grown individuals quite small. The third joint, seen from the outer side (fig. 4c) with the dorsal keel high, occupying the distal half of the joint, with the front margin long and a little oblique, the angle between this margin and the upper margin being about 100°.— The antennae nearly as in *E. distinguenda*.

Third abdominal segment with a dorsal, slender, spiniform, compressed process a little or scarcely more than one third as long as the next segment; fourth and fifth segments without any vestige of dorsal denticles. Sixth segment long, even a little more than twice as long as deep.— Exopod of uropods a little longer than the endopod and conspicuously shorter than the telson.

The copulatory organs (Plate 8, fig. 4e; Plate 9, fig. 1a) show some similarity to those of *E. distinguenda*, but there are several differences. The terminal process has a rather long foot, but its heel is somewhat short and curved,

and the process beyond the foot is rather long, regularly tapering in breadth from the robust base to the acute end; also a little curved and towards the acute end curved considerably inwards. The proximal process has the proximal three fifths robust and somewhat curved, with the inner margin concave and the outer more convex, as the part at the middle is thicker than at each end; the distal two fifths are flattened, towards the end quite flat, with the proximal half of its antero-interior margin somewhat convex, as this part, seen from behind (fig. 1a), is considerably expanded; then it tapers in breadth towards the rounded end and the most distal part is so flattened that, seen from the inner side (fig. 4e), it looks quite thin with the end nearly acute. The median lobe has its terminal part produced as a narrow but moderately short lobe which is rounded at the end and directed obliquely forwards, it is therefore seen better from the inner side (fig. 4e); the lateral process is of moderate size, curved inwards more or less beyond the middle and with a sharp dorsal tooth slightly beyond the curvature. The auxiliary lobe is long. The setiferous lobe is broad, with six setae from the triangularly produced terminal part, but with no setae along the outer margin.

Length of adult males 7.5–10 mm., of a large female 10.8 mm.

Type.— A male from Sta. 4652; 100 fms. to surface.

Remarks.— This small species is easily distinguished from all other forms by the large, movable lamella projecting from the second antennular joint and covering a large portion of the upper and outer portion of third joint. The shape of the short frontal plate, of the lobe from the first antennular joint, etc., afford other valuable characters.

Distribution.— The list of localities shows that *E. lamelligera* is common in the eastern part of the area explored in 1904–1905, but only between Lat. 20° N. and Lat. $10\frac{1}{3}$° S., furthermore it was frequently taken at the surface and at times in considerable numbers. The species is unknown to me from any other area or ocean.

24. **Euphausia gibboides** Ortmann.

Plate 9, figs. 2a–2h.

1893. *Euphausia gibboides* Ortmann, Ergebn. der Plankton-Exped., **2**, G., b., p. 12, taf. 1, fig 5.
1911. *Euphausia gibboides* H. J. Hansen, Bull. Mus. Océan. Monaco, no. 210, p. 33.

Sta. 4634. Nov. 4, 1904. Lat. 4° 35.1′ N., long. 83° 32.3′ W. 300 fms. to surface. 2 specimens.
Sta. 4637. Nov. 5, 1904. Lat. 1° 31′ N., long. 86° 32′ W. 300 fms. to surface. 20 specimens.
Sta. 4638. Nov. 6, 1904. Lat. 0° 27′ N., long. 87° 13′ W. 300 fms. to surface. 2 specimens.
Sta. 4715. Jan. 2, 1905. Lat. 2° 40.4′ S., long. 90° 19.3′ W. 300 fms. to surface. 1 specimen.
Sta. 4716. Jan. 2, 1905. Lat. 2° 18.5′ S., long. 90° 2.6′ W. 600 fms. to surface. 2 specimens.
Sta. 4717. Jan. 13, 1905. Lat. 5° 10′ S., long. 98° 56′ W. 300 fms. to surface. 1 specimen.
Sta. 4742. Feb. 15, 1905. Lat. 0° 3.4′ N., long. 117° 15.8′ W. 300 fms. to surface. 5 specimens.

Furthermore the species was taken twice in 1897 by Dr. Agassiz, viz.:—

Fiji Islands. Dec. 11, 1897. 6 m. South of Suva lightship. 150 fms. 4 specimens.
Fiji Islands. Dec. 11, 1897. 3 m. South of Suva lightship. 100 fms. 1 specimen.

Description.— Body rather stout.— Frontal plate (fig. 2a) is very short, subangular at each side; anteriorly it is produced into a rather long rostrum, the basal part of which is a comparatively somewhat large triangle a little broader than long, while its distal portion is spiniform. The gastric area is, seen from the side (fig. 2b), highly vaulted; the keel from the middle of the rostrum and along that area is sharp.

The eyes are large.— The antennular peduncles moderately robust; the first joint is raised considerably above towards the upper terminal margin (fig. 2c), the major part of which is nearly transverse (fig. 2d), but the inner part is produced into a moderately long lobe projecting forwards and somewhat upwards, tapering in breadth to beyond the middle where it abruptly bends much outwards, this terminal part forming an oblong, acute triangle directed more outwards than forwards. Second joint, seen from above (fig. 2d), is as usually with the inner margin somewhat longer anteriorly than the outer, but the terminal upper margin is not oblique, but transverse, even a little and sometimes considerably concave, extending to about the outer margin of third joint, where it suddenly bends in the proximal direction parallel with the last-named margin; in this way a kind of short, broad lobe is circumscribed, which covers the proximal part of the upper surface of the third joint with the exception of its outermost portion; and the outer part of this lobe is produced slightly or conspicuously forwards, when the transverse terminal margin is considerably concave. The third joint, beginning only a little from the lobe of second joint, has the dorsal keel high; it rises in height to somewhat beyond the middle and is there produced into a slender, porrected tooth; the front margin of the keel is very oblique and deeply incised just below the upper end, the incision limiting the tooth mentioned.— The antennal squama is moderately broad, at most reaching the middle of third antennular joint and without any marginal tooth at the somewhat broad end; the spiniform process from the outer side of the peduncle is long, about half as long as the squama.

First and second abdominal segments at the middle of the dorsal posterior margin are produced a little, but the protuberance is feebly rounded, not angular. Third segment with a short dorsal process which at the base is a carinated plate and distally slender and almost compressed, acute. Fourth and fifth segments without vestige of any dorsal tooth. Sixth segment moderately long, with the

proximal part somewhat deep; preanal spine simple in both sexes.— Exopod of the uropods as long as the telson and as long as or a little shorter than the endopod.

The copulatory organs (figs. 2e–2h) differ in some features from those of above-described forms. The terminal process (p^2.) has the foot of moderate length, the heel rather short, thick, and straight; and the process beyond the foot is moderately long, rather slender and tapering to the acute end; seen from behind straight (fig. 2e), seen from the inner side somewhat curved (fig. 2g). The proximal process (p^3.) is, seen from behind (figs. 2e and 2f), long and nearly regularly curved, constituting about one fourth of a circle; its basal part is very moderately robust, somewhat convex on the outer side; it then tapers gradually to a little before the end, where on the inner — the proximal — margin it has a kind of oblong expansion with a slender tooth from the proximal angle (fig. 2f); seen from the inner side (fig. 2h) this terminal part shows itself as an oblong, rather broad, distally broadly rounded plate placed obliquely on the end of the slender part of the process and possessing the long, slender tooth at its base; a comparison of fig. 2f with fig. 2h, the latter figure showing the plate a good deal shorter than it is in reality because its position is very oblique in proportion to the direction of the view, will show further details not mentioned in the text as to curvature, etc. The median lobe is produced in some degree from the base on the inner side into a somewhat small, oblique, conical tubercle, (a in fig. 2e and fig. 2g); the most distal part of the lobe is widened a little at the curvature of the lateral process and then it tapers to the acute tip (fig. 2g); the lateral process is of moderate size, thick at the base, much bent inwards considerably beyond the middle and without any tooth at the curvature; a minute tooth inserted on the inner side of the lobe, off the curvature of the lateral process, may be interpreted as a rudiment of an additional process. The auxiliary lobe is thicker and a little shorter than in the two preceding species. The setiferous lobe is moderately broad with a couple of setae on the distal part of the inner margin; there are six setae on the triangularly produced terminal part and about three setae (fig. 2g, but not visible in fig. 2e) on the proximal half of the outer side near the outer margin.

Length of an adult male 22 mm., of a very large female 27 mm.

Remarks.— This large species is easily distinguished by the rather long rostrum together with the shape of the lobes from first and second antennular joints. The copulatory organs exhibit features useful as specific characters.

Distribution.— *E. gibboides* Ortm. was established on numerous specimens

collected by the German Plankton-Expedition in various areas of the warmer temperate and the tropical Atlantic, viz: —Sargasso Sea, Northern equatorial current, Guinea current, and Southern equatorial current. The Prince of Monaco secured it at various places in the Eastern Atlantic between Lat. $32\frac{1}{2}°$ N. and Lat. $27\frac{2}{3}°$ N. It is not known from the Indian Ocean, but the Copenhagen Museum possesses a specimen from the Southern Chinese Sea at Lat. 9° 40′ N., long. 109° 20′ E. According to the list of localities from the East Pacific the species was taken only at a small number of Stations all situated in the transverse area between Lat. 4° 35′ N. and Lat. 5° 10′ S. Ortmann enumerated three Stations from the Eastern Pacific, two of which are near the line and not far from the Galapagos, while the third is widely distant, viz. Lat. 35° 19.5′ N., long. 125° 21.5′ W.— The species has very rarely been taken at the surface.

25. **Euphausia mucronata** G. O. Sars.

Plate 9, figs. 3a–3g.

1883. *Euphausia mucronata* G. O. Sars, Forh. Vid. Selsk. Christiania for 1883, no. 7, p. 16.
1885. *Euphausia mucronata* G. O. Sars, Chailenger Rept., **13**, p. 87, pl. 15, figs. 9–11.
1911. *Euphausia mucronata* H. J. Hansen, Bull. Mus. Océan. Monaco, no. 210, p. 33. (With one text-figure).

Sta. 4652. Nov. 11, 1904. Lat. 5° 47.7′ S., long. 82° 39.5′ W. 100 fms. to surface. 1 specimen.
Sta. 4655. Nov. 12, 1904. Lat. 5° 57.5′ S., long. 80° 50′ W. { Surface. 2 specimens. / 100 fms. to surface. 22 specimens.
Sta. 4657. Nov. 13, 1904. Lat. 7° 12.5′ S., long. 84° 9′ W. 300 fms. to surface. 8 specimens.
Sta. 4667. Nov. 18, 1904. Lat. 11° 59.5′ S., long. 83° 40.4′ W. 300 fms. to surface. 2 specimens.
Sta. 4668. Nov. 19, 1904. Lat. 12° 9.3′ S., long. 81° 45.2′ W. Open part of Tanner net, 300 fms. to surface. 3 specimens.
Sta. 4669. Nov. 19, 1904. Lat. 12° 12.7′ S., long. 80° 25.6′ W. 300 fms. to surface. 8 specimens.
Sta. 4671. Nov. 20, 1904. Lat. 12° 6.9′ S., long. 78° 28.2′ W. 300 fms. to surface. 31 specimens.
Sta. 4673. Nov. 21, 1904. Lat. 12° 30.5′ S., long. 77° 49.4′ W. { Surface. 13 specimens. / 300 fms. to surface. 30 specimens.
Sta. 4676. Dec. 5, 1904. Lat. 14° 28.9′ S., long. 81° 24′ W. 300 fms. to surface. 69 specimens.
Sta. 4677. Dec. 5, 1904. Lat. 14° 37.5′ S., long. 81° 41′ W. Surface. 4 specimens.

Description.— Body moderately slender.— Frontal plate (fig. 3a) very short, somewhat protruding but not angular at the sides, produced into a badly defined, short rostrum about three times as broad as long with the end acute or subacute. The gastric area, seen from the side (fig. 3b), highly vaulted with the upper margin angular or subangular; the median keel along this area is sharp but terminates anteriorly nearly at the base of the rostrum (fig. 3a).

The eyes are extremely large.— The antennular peduncles are moderately robust; first joint, seen from the side (fig. 3c) elevated towards the end, where it is produced in a rather short, deeply bifid lobe (fig. 3d) with its two oblong, acute teeth directed somewhat upwards and more outwards than forwards, the

lobe therefore overlapping a very small portion of the next joint; the inner tooth of the lobe is generally longer and stouter than the outer. Second joint conspicuously longer than third, with its dorsal wall produced feebly in front above the base of third joint and the upper terminal margin near the outer side produced in a low, acute angle (fig. 3d); third joint, seen from the side (fig. 3e), with the dorsal keel occupying somewhat more than half of the upper margin, moderately high and increasing in height to the end which in well-preserved specimens is produced in an acute denticle, while the front margin is steep, not quite vertical.— The antennal squama somewhat broad, with the terminal margin of middle length, transverse, without tooth at the outer margin. The spiniform process from the outer side of the peduncle short, less than one fourth or one fifth as long as the squama.

First and second abdominal segments at the middle of the upper posterior margin a little produced, but the protuberance is broadly rounded. Third segment a little expanded backwards at the middle of the hind margin and produced in a somewhat short, strong, conspicuously compressed, acute process, which has the upper margin a little curved, the lower straight, and the process is continued a little forwards as a keel. Fourth and fifth segments with the hind margin distinctly produced in the median line, forming either a sharp angle or a very short denticle. Sixth segment moderately long, somewhat less than twice as long as deep. Preanal spine wanting in both sexes.— Uropods with the rami subequal in length and as long as, or a little shorter than, the telson.

The copulatory organs (figs. 3e–3g) differ in several features from those in allied forms. The terminal process (p^2.) with the foot moderately long, the heel rather short but considerably curved, the part beyond the foot moderately long, somewhat slender, proximally straight, distally curved considerably inwards and forwards and with the terminal part a little expanded and flattened, very oblong-oval with the end blunt. The proximal process (p^3.) is of very moderate length; almost all the proximal half is rather stout and a little bent before its middle; the distal half is bent strongly inwards and tapers considerably to not far from the end, while the terminal portion is abruptly very much expanded, seen from the inner side (fig. 3g) forming a broad plate bent strongly backwards (in the figure therefore to the right), and with a sharp, protruding angle on its proximal part; seen from behind (fig. 3f) this terminal plate is oblong, somewhat expanded upwards, and this expanded part seemingly proximally produced into a long tooth crossing the posterior surface of the process and projecting

on its proximal or inner side; that this terminal part is so extremely different in outline when seen from the inner side and from behind is due to its very curious shape and the irregular curvature of the plate itself. The distal part of the median lobe is produced in a rather long, tapering, terminally rounded lobe projecting very much beyond the distal part of the lateral process; this process (p^1.) is somewhat small, beyond the middle strongly curved inwards and without any tooth at the bend; the additional process (p^5.) is shaped as a rather small but strong spine inserted a little beyond the curvature of the lateral process. The auxiliary lobe is long and slender. The setiferous lobe is broad, with setae along the distal part of the inner margin, along both margins of the triangularly produced terminal part and along almost the proximal two thirds of the outer margin, leaving the distal shorter part naked.

Length of males 18.5–19.5 mm., of one of the largest females 22 mm.

Remarks.— According to my examination of Sars's type in the British Museum his figures and description are incorrect in several particulars. It may be pointed out that the type has the lobe of first antennular joint with two teeth, the process on the third abdominal segment cannot be described as "mucronate", because its lower margin is straight but the upper margin convex, and the eye is too small in the figure. These specimens were certainly not full grown. The species is easily distinguished by having distinctly produced, acute angles or real, small denticles on the upper posterior margin of fourth and fifth abdominal segments, furthermore by its extremely large eyes, the bifid and very oblique lobe from first antennular joint but with no ear-like process or lamella on second joint, etc.

Distribution.— The ten Stations above named are all situated in a rather small area along the coast of Peru; the Station most remote from that coast is at a distance from it of about 120 geographical miles. Sars's specimens were taken off the coast of Chile. This species is unknown from any other area in the Pacific, as the specimens referred to it by Ortmann belong to the two preceding species. And it was never found in the Indian Ocean or the Atlantic.

PSEUDEUPHAUSIA H. J. Hansen (1910).

Only a single species is known.

26. **Pseudeuphausia latifrons** G. O. Sars.

1883. *Euphausia latifrons* G. O. Sars, Forh. Vid. Selsk. Christiania for 1883, no. 7, p. 19.
1885. *Euphausia latifrons* G. O. Sars, Challenger Rept., **13**, p. 95, pl. 16, figs. 17–23.
1910. *Pseudeuphausia latifrons* H. J. Hansen, Siboga-Exp., **37**, p. 103, pl. 15, figs. 1a–1d.

Not a specimen of this species was found among the material secured in 1904–1905, but Dr. Agassiz has taken a number of specimens at several localities in the Fiji Islands in 1897.

Fiji Islands. Off Vatu. Dec. 9, 1897. 30 fms. 12 specimens.
Fiji Islands. 3 m. South of Nanuka. Dec. 10, 1897. 50 fms. 1 specimen.
Fiji Islands. 6 m. South of Suva lightship. Dec. 10, 1897. 100 fms. 1 specimen.
Fiji Islands. 5 m. South of Suva lightship. Dec. 10, 1897. 100 fms. 4 specimens.
Fiji Islands. 3 m. South of Suva lightship. Dec. 11, 1897. 100 fms. 2 specimens, both adult males.
Fiji Islands. 5 m. South of Suva lightship. Dec. 16, 1897. 100 fms. 1 specimen.
Fiji Islands. Eastern entrance of the Nibengha passage. Dec. 16, 1897. Surface. 14 specimens.
Fiji Islands. Eastern entrance of the Nibengha passage. Dec. 16, 1897. 100 fms. 2 specimens.

Remarks.— All the specimens, excepting two, are immature and many among them less than half grown or merely larval stages. In the following chapter on the larval stages such larvae are mentioned, especially with reference to their differences from the larvae of *Nyctiphanes simplex* H. J. H.

Distribution.— Sars's specimens were from the Southeastern coast of Australia, from the Arafura Sea and off Mindanao, Philippine Islands. The "Siboga" captured enormous multitudes at a large number of Stations in the Indian Archipelago. The Copenhagen Museum possesses some specimens taken at Lat. 24° 17′ N., long. 118° 15′ E., between Formosa and China (Capt. Suenson) and many specimens from the Bay of Bengal ("Galathea" Exp.). Stebbing mentioned it "as observed in great numbers N. 10° W. of Cape St. Blaize, 33 miles (South coast of Africa).

This peculiar form seems always to live not very far from land, and it has most frequently been taken near the surface.

NEMATOSCELIS G. O. Sars (1883).

The account of this genus given by Sars in the "Challenger" Report is somewhat deficient, because his material was very poor; he had in reality no males and of only one species a sufficient numbers of females. In recent papers I have pointed out interesting sexual differences and various characters in maxillulae, thoracic legs, and copulatory organs. And it may be useful to reprint here the addition to the generic description, etc. given in 1911.

In the female second and third peduncular joints of the antennulae are slender and rather long; in adult males these joints are conspicuously thicker, second joint somewhat and the third considerably shorter than in the other sex; peculiar lobes or processes on these joints are always wanting. Sixth pair of legs with the exopod well developed in both sexes, the endopod two-jointed and longer than the exopod in the female, wanting in the male. The

copulatory organs possess the three processes on the inner lobe, but the spine-shaped process is nearly straight and nearly parallel with the two others which are inserted on the end of the lobe; the lateral process is never hook-shaped and an additional process is wanting. – The females carry their eggs.

It may be added that in the majority of the species the rostrum is rather long or extremely so in the female, much smaller or quite rudimentary in the adult male.

Six species are known. They may be divided into two groups separated by some sharp and interesting characters.

A. *Maxillulae with a pseudexopod well developed. First elongate pair of thoracic legs with long spines both from the terminal joint and from the distal end of the penultimate joint. Endopod of second to fifth pairs of thoracic legs with the full number, viz. three, joints beyond the knee.*

B. *Maxillulae without pseudexopod. First elongate pair of thoracic legs with long spines only from the terminal joint. Endopod of second and third pairs of thoracic legs with but two joints beyond the knee; endopod of fourth and fifth pairs with only one joint beyond the knee.*

Group A comprises two species, but they are not represented in the material received from Dr. Agassiz. Group B comprises four species which can be separated by the key in the "Siboga" paper, p. 107; three of these species are dealt with below.

27. **Nematoscelis microps** G. O. Sars.

Plate 9, figs. 4a–4d; Plate 10, figs. 1a–1b.

1883. *Nematoscelis microps*. G. O. Sars, Forh. Vid. Selsk. Christiania for 1883, no. 7, p. 28.
1885. *Nematoscelis microps* G. O. Sars, Challenger Rept., **13**, p. 131, pl. 25, figs. 1–4.
1910. *Nematoscelis microps* H. J. Hansen, Siboga-Exp., **37**, p. 107, pl. 15, figs. 2a–2k. (With full synonymy).

Sta. 4679.	Dec. 7, 1904.	Lat. 17° 26.4′ S., long. 86° 46.5′ W.	300 fms. to surface. 1 specimen.
Sta. 4681.	Dec. 8, 1904.	Lat. 18° 47.1′ S., long. 89° 26′ W.	300 fms. to surface. 6 specimens.
Sta. 4683.	Dec. 9, 1904.	Lat. 20° 2.4′ S., long. 91° 52.5′ W.	300 fms. to surface. 3 specimens.
Sta. 4685.	Dec. 10, 1904.	Lat. 21° 36.2′ S., long. 94° 56′ W.	300 fms. to surface. 11 specimens.
Sta. 4687.	Dec. 11, 1904.	Lat. 22° 49.5′ S., long. 97° 30.6′ W.	300 fms. to surface. 3 specimens. 2125 fms. to surface. 1 specimen.
Sta. 4689.	Dec. 12, 1904.	Lat. 24° 5′ S., long. 100° 20′ W.	300 fms. to surface. 1 specimen.
Sta. 4691.	Dec. 13, 1904.	Lat. 25° 27.3′ S., long. 103° 29.3′ W.	300 fms. to surface. 5 specimens.
Sta. 4695.	Dec. 23, 1904.	Lat. 25° 22.4′ S., long. 107° 45′ W.	300 fms. to surface. 2 specimens.
Sta. 4701.	Dec. 26, 1904.	Lat. 19° 11.5′ S., long. 102° 24′ W.	300 fms. to surface. 4 specimens.
Sta. 4703.	Dec. 27, 1904.	Lat. 17° 18.6′ S., long. 100° 52.3′ W.	300 fms. to surface. 1 specimen.
Sta. 4705.	Dec. 28, 1904.	Lat. 15° 5.3′ S., long. 99° 19′ W.	300 fms. to surface. 12 specimens.
Sta. 4707.	Dec. 29, 1904.	Lat. 12° 33.2′ S., long. 97° 12′ W.	300 fms. to surface. 2 specimens.
Sta. 4729.	Jan. 19, 1905.	Lat. 14° 15′ S., long. 115° 13′ W.	Surface. 1 specimen.

Sta. 4730. Jan. 20, 1905. Lat. 15° 7′ S., long. 117° 1.2′ W. 300 fms. to surface. 14 specimens.
Sta. 4732. Jan. 21, 1905. Lat. 16° 32.5′ S., long. 119° 59′ W. 300 fms. to surface. 9 specimens.
Sta. 4734. Jan. 22, 1905. Lat. 17° 36′ S., long. 122° 35.6′ W. 300 fms. to surface. 2 specimens.
Sta. 4742. Feb. 15, 1905. Lat. 0° 3.4′ N., long. 117° 15.8′ W. 300 fms. to surface. 2 specimens.

Finally from the following locality:—

Fiji Islands. 5 m. South of Suva lightship. Dec. 16, 1897. 100 fms. 1 small specimen. A. Agassiz.

To the description and remarks in the "Siboga" paper a few points may be added.

The maxillae (fig. 1a) have the main part, viz. second and third joints with their lobes, very large in proportion to the fourth joint; the palp, which is much smaller than in the two following species, scarcely half as long again as broad and only a little more than half as long as the inner margin of the lobe of third joint.

In most adult females the rostrum is long (fig. 4c) and only moderately broad towards the base, but in two or three females the rostrum is very short and broadly rounded (fig. 4d); whether this aberrant feature is an individual anomaly or is due to damage days or weeks before the capture of the individuals cannot be decided. The adult males from the East Pacific differ from those from other oceans by having the very slender rostrum (fig. 4a) appreciably longer, about as long as or a little longer than the breadth of the second antennular joint. Finally immature males before the last moult may be mentioned. As is seen from a comparison of fig. 4a, representing an adult male, with fig. 4b representing an immature male — and both figures were drawn with the same degree of enlargement — the two distal joints of the antennular peduncles are proportionately more slender and especially the third joint conspicuously longer in the immature than in the adult, furthermore the former has the rostrum somewhat longer and broader at the base than is the case in the adult.— Finally the copulatory organs, as the difference in the relative length of the processes in the adult and in the immature male is interesting and at first sight even bewildering.

In the adult *N. microps* the proximal process is, as shown in the "Siboga" paper, considerably or much longer than the terminal process, while in the immatures males the difference between the length of the two processes mentioned is slight (Plate 10, fig. 1b), thus in this respect only it is but slightly different from the feature found in *N. atlantica* H. J. H. (In the latter species, however, the terminal process overreaches considerably the spine-shaped process, which is not the case in the immature *N. microps*). And it is very interesting

that the processes are so highly developed in males before their last moult; that such specimens are immature can easily be seen by comparing the distal joints of their antennular peduncles with those in adult specimens.

One of the largest females is 21 mm. long, an adult male 16 mm. and an immature male 13 mm.; fig. 4c, fig. 4a, fig. 4b exhibit the front part of these specimens.

Distribution.— The list above shows that all localities excepting one are situated in a transverse southern belt of the area explored, between about Lat. 12° 33′ S. and Lat. 25° 27′ S., and that the belt is rather far from reaching the West coast of South America; a single locality (Sta. 4742) is situated near the line.— In the "Siboga" paper a good number of Stations in the Indian Archipelago were enumerated, and besides it was stated that I have this species in the Monaco material from the warmer temperate northeastern Atlantic. Sars's type is from the "Pacific, North of the Sandwich Islands." But all the localities enumerated in the literature before the "Siboga" paper must be considered valueless, because *N. microps* has been confounded with *N. atlantica* H. J. H., *N. gracilis* H. J. H.— both species established in 1910 — and partly even with *N. tenella* G. O. S. I have seen Ortmann's specimens from the first six of the eight localities enumerated for *N. microps* in 1894, and all belong to the two following species. *N. microps* is very rarely taken at the surface.

28. **Nematoscelis gracilis** H. J. Hansen.

Plate 10, fig. 2a.

1910. *Nematoscelis gracilis* H. J. Hansen, Siboga-Exp., **37**, p. 109, pl. 15, figs. 3a–3g.

Sta. 4598.	Oct. 15, 1904.	Lat. 15° 58′ N., long. 98° 13′ W.	300 fms. to surface. 3 specimens.
Sta. 4605.	Oct. 17, 1904.	Lat. 12° 21′ N., long. 92° 13′ W.	300 fms. to surface. 1 small specimen.
Sta. 4611.	Oct. 18, 1904.	Lat. 10° 33′ N., long. 88° 30′ W.	Surface. 53 small specimens.
Sta. 4613.	Oct. 19, 1904.	Lat. 9° 45′ N., long. 86° 20′ W.	300 fms. to surface. 10 small specimens.
Sta. 4634.	Nov. 1, 1904.	Lat. 4° 35.4′ N., long. 83° 32.3′ W.	300 fms. to surface. 10 specimens.
Sta. 4637.	Nov. 5, 1904.	Lat. 1° 31′ N., long. 86° 32′ W.	300 fms. to surface. 10 specimens.
Sta. 4646.	Nov. 8, 1904.	Lat. 4° 1.6′ S., long. 89° 16.3′ W.	300 fms. to surface. 7 specimens.
Sta. 4649.	Nov. 9, 1904.	Lat. 5° 17′ S., long. 85° 19.5′ W.	300 fms. to surface. 9 specimens.
Sta. 4650.	Nov. 10, 1904.	Lat. 5° 22′ S., long. 84° 39′ W.	300 fms. to surface. 6 specimens.
Sta. 4652.	Nov. 11, 1904.	Lat. 5° 14.7′ S., long. 82° 39.5′ W.	100 fms. to surface. 9 specimens. 200 fms. to surface. 2 specimens. 400 fms. to surface. 6 specimens.
Sta. 4655.	Nov. 12, 1904.	Lat. 5° 57.5′ S., long. 80° 50′ W.	400 fms. to surface. 1 specimen.
Sta. 4657.	Nov. 13, 1904.	Lat. 7° 12.5′ S., long. 81° 9′ W.	300 fms. to surface. 2 specimens.
Sta. 4659.	Nov. 14, 1904.	Lat. 8° 54.5′ S., long. 86° 5.5′ W.	300 fms. to surface. 11 specimens.
Sta. 4661.	Nov. 15, 1904.	Lat. 10° 17′ S., long. 88° 2′ W.	300 fms. to surface. 1 specimen.
Sta. 4663.	Nov. 16, 1904.	Lat. 11° 20.3′ S., long. 88° 55.2′ W.	300 fms. to surface. 5 specimens.
Sta. 4664.	Nov. 17, 1904.	Lat. 11° 30.3′ S., long. 87° 19′ W.	300 fms. to surface. 4 specimens.
Sta. 4665.	Nov. 17, 1904.	Lat. 11° 45′ S., long. 86° 5.2′ W.	300 fms. to surface. 19 specimens.
Sta. 4667.	Nov. 18, 1904.	Lat. 11° 59.5′ S., long. 83° 10.4′ W.	300 fms. to surface. 3 specimens.

Sta. 4668.	Nov. 19, 1904.	Lat. 12° 9.3′ S., long. 81° 45.2′ W.	Top of Tanner net, 300 fms. to surface. 1 specimen. Bottom of Tanner net, 300 fms. 10 specimens.
Sta. 4669.	Nov. 19, 1904.	Lat. 12° 12.7′ S., long. 80° 25.6′ W.	300 fms. to surface. 5 specimens.
Sta. 4671.	Nov. 20, 1901.	Lat. 12° 6.9′ S., long. 78° 28 2′ W.	Surface. 1 small specimen.. 300 fms. to surface. 2 specimens.
Sta. 4676.	Dec. 5, 1901.	Lat. 14° 28.9′ S., long. 81° 24′ W.	300 fms. to surface. 3 specimens.
Sta. 4679.	Dec. 7, 1904.	Lat. 17° 26.4′ S., long. 86° 46 5′ W.	300 fms. to surface. 4 specimens.
Sta. 4681.	Dec. 8, 1901.	Lat. 18° 47.1′ S., long. 89° 26′ W.	300 fms. to surface. 1 specimen.
Sta. 4683	Dec. 9, 1901.	Lat. 20° 2.4′ S., long. 91° 52.5′ W.	300 fms. to surface. 1 specimen.
Sta. 1701.	Dec. 26, 1904.	Lat. 19° 11.5′ S., long. 102° 24′ W.	300 fms. to surface. 4 specimens.
Sta. 4703.	Dec. 27, 1904.	Lat. 17° 18.6′ S., long. 100° 52.3′ W.	300 fms. to surface. 2 specimens.
Sta. 4705.	Dec. 28, 1904.	Lat. 15° 5.3′ S., long. 99° 19′ W.	300 fms. to surface. 33 specimens.
Sta. 4707.	Dec. 29, 1904.	Lat. 12° 32.2′ S., long. 97° 42′ W.	300 fms. to surface. 8 specimens.
Sta. 4709.	Dec. 30, 1904.	Lat. 10° 15.2′ S., long. 95° 40.8′ W.	300 fms. to surface. 40 specimens.
Sta. 4710.	Dec. 30, 1904.	Lat. 9° 30.5′ S., long. 95° 8.3′ W.	Surface. 3 small specimens.
Sta. 4711.	Dec. 31, 1904.	Lat. 7° 45.7′ S., 94° 5.5′ W.	300 fms. to surface. 11 specimens.
Sta. 4712.	Dec. 31, 1904.	Lat. 7° 5′ S., long. 93° 35.5′ W.	Surface. 4 specimens, 3 of which small, and 1 not full-grown.
Sta. 4713.	Jan. 1, 1905.	Lat. 5° 35.3′ S., long. 92° 21.6′ W.	300 fms. to surface. 29 specimens.
Sta. 4715.	Jan. 2, 1905.	Lat. 2° 40.4′ S., long. 90° 19.3′ W.	300 fms. to surface. 4 specimens.
Sta. 4716.	Jan. 2, 1905.	Lat. 2° 18.5′ S., long. 90° 2.6′ W.	600 fms. to surface. 1 specimen.
Sta. 4717.	Jan. 13, 1905.	Lat. 5° 10′ S., long. 98° 56′ W.	300 fms. to surface. 19 specimens.
Sta. 4719.	Jan. 14, 1905.	Lat. 6° 29.8′ S., long. 101° 16.8′ W.	300 fms. to surface. 17 specimens.
Sta. 4721.	Jan. 15, 1905.	Lat. 8° 7.5′ S., long. 104° 10.5′ W.	300 fms. to surface. 17 specimens.
Sta. 4722.	Jan. 16, 1905.	Lat. 9° 31′ S., long. 106° 30.5′ W.	300 fms. to surface. 17 specimens.
Sta. 4724.	Jan. 17, 1905.	Lat. 11° 13.4′ S., long. 109° 39′ W.	300 fms. to surface. 1 specimen.
Sta. 4728.	Jan. 19, 1905.	Lat. 13° 47.5′ S., long. 114° 21.6′ W.	300 fms. to surface. 1 specimen.
Sta. 4730.	Jan. 20, 1905.	Lat. 15° 7′ S., long. 117° 1.2′ W.	300 fms. to surface. 5 specimens.
Sta. 4732.	Jan. 21, 1905.	Lat. 16° 32.5′ S., long. 119° 59′ W.	300 fms. to surface. 2 specimens.

The adult males from the Pacific have no denticle on the posterior part of the lateral margin of the carapace.

The maxillae (fig. 2a) differ considerably as to the relative size of their main part and the palp from those of *N. microps*, the palp being nearly as long as the inner margin of the lobe of third joint and about half as long again as broad.

In immature specimens measuring 9–10 mm. in length the frontal plate with the not defined rostrum is longer and anteriorly more produced than in the adults, and the upper section of the eyes is considerably smaller than the lower. In still smaller specimens, 6.5–7 mm. long, the frontal plate is proportionately still longer, reaching beyond the eyes and with the distal third of the lateral margin somewhat convex and the tip itself acuminate and acute; the upper section of the eyes is much smaller than the lower, and the dorsal keel on the carapace is very conspicuous, but its highest part with the anterior margin more oblique than in the young of *N. microps* (comp. the "Siboga" paper).

One of the largest females is 18.5 mm. long; a good-sized male is 14.5 mm., but most adult specimens of both sexes are somewhat or sometimes considerably smaller.

Distribution. The long list of Stations shows that *N. gracilis* was wanting in the most southern part of the area explored, viz. South of Lat. 20° S., that it was very common between Lat. 20° S. and the line, and that it was taken six times North of the line, northwards to near Lat. 16° N. The specimens from the six first-named of Ortmann's Stations (1894) for *N. microps* all belong to *N. gracilis*, excepting two specimens which belong to *N. tenella* G. O. S. and are mentioned below; furthermore the specimens from a single Station (from Lat. 12° 34′ N.) referred by Ortmann to *N. tenella* are also *N. gracilis*; all Ortmann's Stations in question are situated in the area where *N. gracilis* was taken in 1904–1905. Furthermore the species was taken at a number of Stations in the Indian Archipelago by the "Siboga," but is hitherto unknown from any other place and is certainly wanting in the Atlantic.

The list shows also that small specimens have been taken a few times at the surface, but that larger or full-grown specimens, with a single exception, were always taken in the vertical net from 300 fms. to the surface, and that ten specimens were taken in the bottom of the Tanner net towed at 300 fms.

29. **Nematoscelis tenella** G. O. S.

Plate 10, figs. 3a–3c.

1883. *Nematoscelis tenella* G. O. Sars, Forh. Vid. Selsk. Christiania for 1883, no. 7, p. 28.
1885. *Nematoscelis tenella* G. O. Sars, Challenger Rept., **13**, p. 133, pl. 25, figs. 5–7 (young).
1910. *Nematoscelis tenella* H. J. Hansen, Siboga-Exp., **37**, p. 110, pl. 15, figs. 4a–4m. (With full synonymy).

Sta. 4637. Nov. 5, 1904. Lat. 1° 31′ N., long. 86° 32′ W. 300 fms. to surface. 3 specimens.
Sta. 4638. Nov. 6, 1904. Lat. 0° 27′ N., long. 87° 13′ W. 300 fms. to surface. 1 specimen.
Sta. 4646. Nov. 8, 1904. Lat. 4° 1.6′ S., long. 89° 16.3′ W. 300 fms. to surface. 1 specimen.
Sta. 4679. Dec. 7, 1904. Lat. 17° 26.4′ S., long. 86° 46.5′ W. 300 fms. to surface. 1 specimen.
Sta. 4681. Dec. 8, 1904. Lat. 18° 47.1′ S., long. 89° 26′ W. 300 fms. to surface. 5 specimens.
Sta. 4685. Dec. 10, 1904. Lat. 21° 36.2′ S., long. 94° 56′ W. 300 fms. to surface. 3 specimens.
Sta. 4687. Dec. 11, 1904. Lat. 22° 49.5′ S., long. 97° 30.6′ W. 300 fms. to surface. 1 specimen.
Sta. 4689. Dec. 12, 1904. Lat. 24° 5′ S., long. 100° 20′ W. 300 fms. to surface. 5 specimens.
Sta. 4691. Dec. 13, 1904. Lat. 25° 27.3′ S., long. 103° 29.3′ W. 300 fms. to surface. 1 specimen.
Sta. 4699. Dec. 25, 1904. Lat. 21° 39.5′ S., long. 104° 29.8′ W. 300 fms. to surface. 1 specimen.
Sta. 4705. Dec. 28, 1904. Lat. 15° 15.3′ S., long. 99° 19′ W. 300 fms. to surface. 6 specimens.
Sta. 4707. Dec. 29, 1904. Lat. 12° 33.2′ S., long. 97° 42′ W. 300 fms. to surface 7 specimens.
Sta. 4715. Jan. 2, 1905. Lat. 2° 40.4′ S., long. 90° 19.3′ W. 300 fms. to surface. 2 specimens.
Sta. 4716. Jan. 2, 1905. Lat. 2° 18.5′ S., long. 90° 2.6′ W. 600 fms. to surface. 1 specimen
Sta. 4721. Jan. 15, 1905. Lat. 8° 7.5′ S., long. 104° 10.5′ W. 300 fms. to surface. 6 specimens.
Sta. 4722. Jan. 16, 1905. Lat. 9° 31′ S., long. 106° 30.5′ W. 300 fms. to surface. 6 specimens.
Sta. 4730. Jan. 20, 1905. Lat 15° 7′ S., long. 117° 1.2′ W. 300 fms. to surface. 1 specimen.
Sta. 4734. Jan. 22, 1905. Lat. 17° 36′ S., long. 122° 35 6′ W. 300 fms. to surface. 1 specimen.
Sta. 4742. Feb. 15, 1905. Lat. 0° 3.4′ N., long. 117° 15.8′ W. 300 fms. to surface. 1 specimen.

The adult males from the East Pacific — and from the Indian Archipelago — have no denticle posteriorly on the lateral margins of the carapace, while such denticles are found in males from the North Atlantic.

Fig. 3a represents the left maxillula, seen from behind; the palp is long, somewhat slender, increasing a little in breadth from the base to the obliquely truncate end, and the terminal margin has several slender setae and two stiff, nearly spiniform ones, the most distal (fig. 3b) serrate beyond the middle.— The maxillae (fig. 3c) have the palp still longer than in *N. gracilis*, as long as the inner margin of the lobe of third joint and nearly twice as long as broad.

A large female is 19.9 mm., a large male 17.8 mm. long.

Distribution.— The list of Stations shows that *N. tenella* was found in nearly the whole part South of the line of the area explored, excepting in a broad longitudinal belt along South America. As already stated, the specimens from Lat. 12° 34′ N. referred in 1894 by Ortmann to *N. tenella* belong to *N. gracilis* H. J. H.; on the other hand, one of the specimens from Hyd. Sta. 2627 (Lat. 0° 36′ N., long. 82° 45′ W.) and one of the specimens from Sta. 3414 (Lat. 10° 14′ N., long. 96° 28′ W.) referred by him to *N. microps* belong to *N. tenella*. Furthermore the species was taken in the Indian Archipelago by the "Siboga" at a number of Stations; Sars's type was captured South of the Cape of Good Hope, and finally it is known from the Eastern Atlantic between the Canary Islands and Lat. 36° 46′ N.

NEMATOBRACHION Calman. (1905).

(Nematodactylus Calm., 1896).

Description.— Carapace with a cervical suture and without any denticle on its lateral margins.— Eyes divided into two sections, the upper broader than the lower and with its upper surface somewhat flatly vaulted.— Antennulae similar in both sexes; peduncles at least somewhat robust; flagella long, slender, and multiarticulate.— Antennae with the spiniform process from the outer end of the subbasal joint short, about as long as the breadth of the squama; last joint of the peduncle of the endopod as long as or longer than the penultimate and not reaching the end of the squama.— Mandibles with a three-jointed palp.— Maxillulae with or without pseudexopod; the palp slender and at least rather long.— Maxillae with their main part, viz. second and third joints with their lobes, very broad in proportion to the fourth joint, the palp, which is well-marked off, and both lobes with the margin a little bifid.

First pair of thoracic legs only a little longer than the maxillipeds and of the usual structure, slender, with the short last joint a little widened below and furnished with peculiar, short setae. Second pair extremely elongate, without setae or hairs; its third joint thick; fourth joint at most as long as the

third, rather abruptly bent upwards, at a little distance from its base; before this curvature its upper edge is produced into a flat, vertical plate and at a short distance from the curvature the joint is again somewhat bent, but in the opposite direction and thus directed forwards; seventh joint two thirds to three fourths as long as the sixth, at the end with six closely set, long, serrate, stiff but thin spines, four of these projecting from the end, two from the side a little from the end. Third to fifth pairs of legs with the shape and relative length of the joints in the main as in Thysanopoda. Sixth pair of legs with the full number of joints in the somewhat short endopod and the exopod is well developed. Seventh pair with a normally developed, sometimes small exopod, while an endopod is not developed, the exopod-bearing joint terminating in a short, broad lobe with some setae.— Branchiae nearly as in Nematoscelis.— Preanal spine simple in the male, simple or bifid in the female.— Luminous organs as in Thysanopoda, etc.

The copulatory organs of first pleopods in the main as in Thysanopoda, with all lobes and five processes well developed.— No female with ovisacs has been found.

Remarks.— This interesting genus was founded by Dr. Calman on a single specimen of a new species; he named it *Nematodactylus boopis*, and correctly referred *Stylocheiron flexipes* Ortm. to the same genus without having seen any specimen. Later Calman obtained a little more material, among which a mutilated male, of *N. boopis* and then he published additions and corrections to his earlier statements and changed the name of the genus to Nematobrachion, as the former name was preoccupied. Calman's account of the genus and of his single species is very good, but as he has examined only one species, while I possess three species, and as the interesting sexual differences in antennulae and the sixth pair of thoracic legs in the other genera with divided eyes were then nearly unknown, I have thought it useful to give here a description of the genus. I must add that in 1905 I referred *Stylocheiron flexipes* Ortm. to the present genus, having overlooked that this had already been done by Calman in 1896.

According to some remarks in 1905 Calman has felt the difficulty as to the relationships of Nematobrachion and the three other genera with divided eyes and one pair of prehensile legs; in mentioning the two posterior pairs of thoracic legs he correctly pointed out their resemblance with Thysanopoda, and he states that the copulatory organs of first pleopods are "much more complex" than in Stylocheiron or Nematoscelis. Nematobrachion occupies in reality a very

isolated position between the genera with prehensile legs and divided eyes, differing widely from these genera and agreeing with Thysanopoda in having the antennulae similar in both sexes, the endopod of sixth pair of thoracic legs fully developed, five-jointed in both sexes — while in Thysanoëssa, Nematoscelis, and Stylocheiron this endopod is unjointed or two-jointed in the female and wanting in the male — and in the structure and number of processes of the copulatory organs; as to the shape of maxillulae and maxillae it is tolerably intermediate between Thysanopoda and Nematoscelis.

Key to the Species.

a. Frontal plate obtuse, without rostral process. Eyes dark brownish with a light stripe, divided by a groove and the upper section more than twice as deep as the lower which is very small. Antennular peduncles without any process from the distal outer angle of first joint, and with an at most slightly produced acute angle above near the distal outer angle of second joint. No dorsal denticles or processes on the abdominal segments.

N. boopis Calm.

b. Frontal plate terminating in a slender rostrum. Eyes black, conspicuously constricted, with the upper section only somewhat deeper than the lower. Antennular peduncles with a long, spiniform process from the distal outer angle of first joint and with a very conspicuous process from the upper, outer distal end of second joint. Conspicuous dorsal denticles on at least two of the abdominal segments.

   α. The process from second antennular joint with at most the proximal half plate-shaped while the distal part is spiniform. Maxillulae without pseudexopod. Third to sixth abdominal segments each with a single dorsal spiniform process from the hind margin, that of third segment generally considerably longer than the others. Distal third of the terminal process of the copulatory organs, seen from behind, tapering to the narrow, obtuse end . . . *N. flexipes* Ortm.

   β. The process from second antennular joint is a large, oblong plate slightly acuminate at the acute end. Maxillulae with pseudexopod. Fourth and fifth abdominal segments each with a dorsal row of three sharp teeth from the hind margin, but no denticle on the other segments. Distal third of the terminal process of the copulatory organs, seen from behind, very broad with the terminal margin long and incised.

N. sexspinosus H. J. H.

30. **Nematobrachion boopis** Calman.

Plate 10, figs. 4a–4d.

1896. *Nematodactylus boopis* Calman, Trans. Roy. Irish Acad., **31**, p. 17, pl. 2, figs. 19–28.
1905. *Nematobrachion boopis* Calman, Rept. Sea and Inland Fisheries of Ireland, 1902–3, pt. 2, App. **4**, p. 153, pl. 26.

Sta. 4681. Dec. 8, 1904. Lat. 18° 47.1′ S., long. 89° 26′ W. 300 fms. to surface. 2 specimens (1 ♂, 1 immat.).
Sta. 4687. Dec. 11, 1904. Lat. 22° 49.5′ S., long. 97° 30.6′ W. { 300 fms. to surface. 1 specimen. / 2125 fms. to surface. 1 specimen.
Sta. 4695. Dec. 23, 1904. Lat. 25° 22′.4 S., long. 107° 45′ W. 300 fms. to surface. 1 specimen.
Sta. 4705. Dec. 28, 1904. Lat. 15° 5.3′ S., long. 99° 19′ W. 300 fms. to surface. 2 specimens.
Sta. 4707. Dec. 29, 1904. Lat. 12° 32.2′ S., long. 97° 42′ W. 300 fms. to surface. 1 specimen.
Sta. 4722. Jan. 16, 1905. Lat. 9° 31′ S., long. 106° 30.5′ W. 300 fms. to surface. 1 specimen.
Sta. 4724. Jan. 17, 1905. Lat. 11° 13.4′ S., long. 109° 39′ W. 300 fms. to surface. 1 specimen.
Sta. 4712. Feb. 15, 1905. Lat. 0° 3.4′ N., long. 117° 15.8′ W. 300 fms. to surface. 1 specimen.

Description.— Body somewhat clumsy.— The frontal plate is a very short triangle with the vertex obtuse and without any vestige of a rostrum; the lateral margins are very conspicuously raised, nearly vertical; the keel between the cervical groove and the tip of the frontal plate is rather high, with a short portion slightly in front of the middle a little more raised and feebly angular.

The eyes are extremely large, dark brownish or nearly blackish above on the somewhat flatly vaulted upper surface; somewhat lighter on the outer side, on which is seen a nearly horizontal or somewhat oblique light groove, separating the very large upper section from the lower small section which is developed only on the outer side and less than twice as high as the upper.— The antennular peduncles are short and robust, the proximal joint very considerably raised above at the distal end about as a transverse, subvertical lobe which, seen from in front, is subtriangular, much broader than high, with the vertex broadly rounded and very setose; the joint has no spiniform process at the outer distal angle. Second joint somewhat vaulted above towards the end, slightly produced above the base of third joint, with the upper outer corner of this produced part either angular or feebly projecting as a small, short tooth. Third joint with the dorsal keel rather short and moderately low.— Antennal squama somewhat narrow, tapering to the broadly rounded end and without outer distal tooth; terminal joint of the peduncle of the endopod somewhat thickened.

The maxillulae (fig. 4a) with the proximal lobe scarcely as broad as the distal, which is about as broad as long, while the palp is very slender and slightly longer than the outer margin of the distal lobe; a pseudexopod is not developed, but the lobe of the first joint is somewhat expanded in the distal direction. — The maxillae (fig. 4b) with the main part a little longer than broad; the palp

somewhat shorter than the inner margin of the lobe from third joint and twice as long as broad.— Second pair of thoracic legs with fifth joint considerably longer than the sixth.

Abdomen without dorsal processes or teeth. Preanal spine simple in both sexes.— Uropods slightly or scarcely overreaching the telson; the exopod slightly longer than the endopod.— Telson has two longitudinal keels extremely finely serrate along more than half of its length and with a very short and thin seta at each saw-tooth.

The copulatory organs (figs. 4c–4d) show some peculiarities. The spine-shaped process (p^1.) is somewhat small, well curved. The terminal process ($p.^2$) has the basal portion very much thickened and from the outer side of this part the process projects forwards, having the inner margin straight and at some distance from the end suddenly bent somewhat inwards, while the outer margin is convex and the terminal margin in the Pacific specimen obliquely and deeply emarginate[1]; the major part of the process has a flat expansion on the outer side and at the end it is peculiarly shaped, being curved somewhat backwards, as may be seen by a comparison of fig. 4c with fig. 4d. The proximal process has its proximal part very thick and directed forwards and outwards (fig. 4c, p^3.); then it bends abruptly and strongly inwards, is very slender, very long, and at the middle curved in the opposite direction, while the terminal, very thin part is curved semicircularly. The lateral process (p^4.) is rather slender, with the curved distal part short. The additional process (p^5.) as in the other species of the genus consisting of an oblong and feebly curved basal part, from the end of which projects an extremely thin distal portion directed outwards and forming with the thick part an acute angle. The median lobe long and moderately narrow; the auxiliary lobe somewhat short; the setiferous long, somewhat narrow, with setae along the distal part of the inner margin and the major part of the outer margin.

Length of the single adult male 21.5 mm., of a large female 21 mm.

Remarks.— For comparison with the two following species the above description may be useful. Calman has given (in 1905) an excellent figure of the animal; the only point with which I disagree is the position of the eye, as I never found the groove dividing it into two so vertical areas, but at most somewhat oblique and most frequently nearly horizontal.

Distribution.— *N. boopis* goes very far northwards in the Atlantic, as it

[1] In a male from the Monaco collection the terminal margin is very oblique, badly defined from the other margin and slightly incised.

has been taken West of Iceland: Lat. 65° 0′ N., long. 28° 10′ W., furthermore South of Iceland and West of the Faeroes; it was captured at a good number of Stations in the eastern part of the temperate Atlantic, as West of Ireland, West of France and southwards to the Canary Islands (several authors). Some few specimens were taken by the "Siboga" in the Indian Archipelago, and Ortmann mentions it from the waters near Hawaii. According to the foregoing list it was secured at only eight Stations in the East Pacific, sporadically in a large part of the area South of the line. It is not contained in the older rich collection of Euphausiacea in the Copenhagen Museum, taken between 1845 and 1884 by the "Galathea" Expedition and especially by Captains in the merchant marine, and judging from this fact and from the labels of the material at hand I think that *N. boopis* never occurs at the surface, but according to "Thors" catches in the North Atlantic it must sometimes occur in depths between ca. 75 and 25 fms.

31. **Nematobrachion flexipes** (Ortmann).

Plate 10, figs. 5a–5m.

1893. *Stylocheiron flexipes* Ortmann, Ergebn. der Plankton-Exped., **2**, G., b., p. 18, taf. 1, fig. 7.

Sta. 4613.	Oct. 19, 1904.	Lat. 9° 45′ N., long. 86° 20′ W.	300 fms. to surface. 1 specimen.
Sta. 4634.	Nov. 4, 1904.	Lat. 1° 35.4 N., long. 83° 32.3′ W.	300 fms. to surface. 2 specimens.
Sta. 4637.	Nov. 5, 1904.	Lat. 1° 31′ N., long. 86° 32′ W.	300 fms. to surface. 3 specimens.
Sta. 4649.	Nov. 10, 1904.	Lat. 5° 17′ S., long. 85° 19.5′ W.	300 fms. to surface. 1 specimen.
Sta. 4650.	Nov. 10, 1904.	Lat. 5° 22′ S., long. 84° 39′ W.	300 fms. to surface. 1 specimen.
Sta. 4652.	Nov. 11, 1904.	Lat. 5° 44.7′ S., long. 82° 39.5′ W.	200 fms. to surface. 2 specimens. 400 fms. to surface. 1 specimen.
Sta. 4655.	Nov. 12, 1904.	Lat. 5° 57.5′ S., long. 80° 50′ W.	400 fms. to surface. 1 specimen.
Sta. 4663.	Nov. 13, 1904.	Lat. 11° 20.3′ S., long. 88° 55.2′ W.	300 fms. to surface. 1 specimens.
Sta. 4676.	Dec. 5, 1904.	Lat. 11° 28.9′ S., long. 81° 24′ W.	300 fms. to surface. 1 specimeen.
Sta. 4679.	Dec. 7, 1904.	Lat. 17° 26.4′ S., long. 86° 46.5′ W.	300 fms. to surface. 1 specimns.
Sta. 4683.	Dec. 9, 1904.	Lat. 20° 2.4′ S., long. 91° 52.5′ W.	300 fms. to surface. 2 specimen.
Sta. 4685.	Dec 10, 1904.	Lat. 21° 36.2′ S., long. 94° 56′ W.	300 fms. to surface. 1 specimen.
Sta. 4687.	Dec. 11, 1904.	Lat. 22° 49.5′ S., long. 97° 30.6′ W.	2125 fms. to surface. 3 specimens.
Sta. 4689.	Dec. 12, 1904.	Lat. 24° 5′ S., long. 100° 20′ W.	300 fms. to surface. 1 specimen.
Sta. 4691.	Dec. 13, 1904.	Lat. 25° 27.3′ S., long. 103° 29.3′ W.	300 fms. to surface. 1 specimen.
Sta. 4699.	Dec. 25, 1904.	Lat. 21° 39.5′ S., long. 104° 29.8′ W.	300 fms. to surface. 1 specimen.
Sta. 4701.	Dec. 26, 1904.	Lat. 10° 11.5′ S., long. 102° 24′ W.	300 fms. to surface. 2 specimens.
Sta. 4707.	Dec. 29, 1904.	Lat. 12° 32.2′ S., long. 97° 42′ W.	300 fms. to surface. 1 specimen.
Sta. 4709.	Dec. 30, 1904.	Lat. 10° 15.2′ S., long. 95° 40.8′ W.	300 fms. to surface. 1 specimen.
Sta. 4713.	Jan. 1, 1905.	Lat. 5° 35.3′ S., long. 92° 21.6′ W.	300 fms. to surface. 2 specimens.
Sta. 4715.	Jan. 2, 1905.	Lat. 2° 40.4′ S., long. 90° 19.3′ W.	300 fms. to surface. 3 specimens.
Sta. 4717.	Jan. 13, 1905.	Lat. 5° 10′ S., long. 98° 56′ W.	300 fms. to surface. 1 specimens.
Sta. 4719.	Jan. 14, 1905.	Lat. 6° 29.8′ S., long. 101° 16.8′ W.	300 fms. to surface. 3 specimens.
Sta. 4721.	Jan. 15, 1905.	Lat. 8° 7.5′ S., long. 104° 10.5′ W.	300 fms. to surface. 1 specimen.
Sta. 4730.	Jan. 20, 1905.	Lat. 15° 7′ S., long. 117° 1.2′ W.	300 fms. to surface. 2 specimens.
Sta. 4732.	Jan. 21, 1905.	Lat. 16° 32.5′ S., long. 119° 59′ W.	300 fms. to surface. 1 specimen.
Sta. 4736	Jan. 23, 1905.	Lat. 19° 0.4′ S., long. 125° 5.4′ W.	300 fms. to surface. 1 specimen.
Sta. 4742.	Feb. 15, 1905.	Lat. 0° 3.4′ N., long 117° 15.8′ W.	300 fms. to surface. 1 specimen.

Description.— Body scarcely robust, being conspicuously more slender than in *N. boopis.*— The frontal plate is a short triangle (fig. 5a) terminating in a spiniform, long, or moderately long, horizontal rostrum which is very slender from the base and somewhat compressed. The keel between the rostrum and the cervical groove well developed.

Eyes moderately large, black, constricted somewhat below the middle, with the upper section somewhat deeper and very conspicuously thicker than the lower (fig. 5b).— The antennular peduncles longer and conspicuously thinner than in *N. boopis*; first joint with the outer margin very concave (fig. 5a), as the joint widens considerably at the outer side towards the end, and from the outer distal angle a long, spiniform process projects forwards, reaching beyond the middle of the second joint, but somewhat distant from its lateral margin; at the distal end the joint is above raised as a kind of low, subvertical, transverse, setiferous lobe. The second joint is considerably longer than broad, and above at the outer distal angle produced into a process which is lamellar at the base, tapering considerably and with the distal half or nearly two thirds spiniform (fig. 5d); the process is long, directed forwards and somewhat outwards and upwards (figs. 5c and 5d). Third joint with the dorsal keel short and rather low.— The antennal squama reaches nearly the middle of the third antennular joint, is somewhat narrow and tapers considerably to the oblique or nearly terminal margin; a distal outer tooth is very distinct; the terminal joint of the peduncle of the endopod is slender (fig. 5b).

The maxillulae (fig. 5e) with the distal lobe not broader than the proximal and conspicuously longer than broad; the palp considerably longer and broader than in *N. boopis*, overreaching considerably the distal lobe; a pseudexopod is not developed but the middle part of the lobe is somewhat expanded forwards. — The maxillae (fig. 5f) with the main part conspicuously longer than broad; the palp even a little longer than the inner margin of the distal lobe and almost twice as long as broad. Second pair of thoracic legs with fifth joint slightly or scarcely longer than the sixth.

Abdomen with a dorsal spiniform process from the hind margin of third to sixth segments; the process from third segment generally compressed and longer than any of the others, but yet varying very much in length, being sometimes moderately short, sometimes about half as long as the fourth segment; in three adult specimens this spine is rudimentary or wanting, but seems to have been broken off or damaged before the animal was captured; the three other spiniform processes vary also considerably in length; the hind margin of first and

second segments a little angular or conspicuously angular above in the middle line (fig. 5g). The lateral plates of second to fifth segments with the postero-lateral angle acute, and the plate of fifth segment besides somewhat produced (fig. 5g). Preanal spine simple in the male and with an accessory tooth in the female.— Uropods about as long as the telson; the exopod slightly or scarcely longer than the endopod. — The telson with two pairs of small dorsal spines.

The copulatory organs (figs. 5h–5m) differ from those in *N. boopis* by the shape of the terminal and the proximal processes. The terminal process is somewhat less thickened at the base, tapering to the narrow middle and then flattened and almost abruptly and strongly expanded on the outer side and feebly expanded on the inner side; the distal half is, seen from behind (fig. 5i), shaped nearly as an oblique triangle with the inner margin somewhat sinuate, the outer proximal angle very broadly rounded and the vertex narrowly rounded; a little from the distal end the posterior side shows a peculiarly raised part, the shape of which is better understood when looked at from the outer side (p^2. on fig. 5k). The proximal process is somewhat broader than in *N. boopis* and more evenly curved, its distal half is somewhat depressed, and thus broader than deep; the terminal part is much flattened and considerably expanded, forming, seen from the base of the organ, an oblong-oval plate (fig. 5m) with nearly the whole margin finely serrate. The median lobe long and slender (fig. 5h) with its two processes nearly as in *N. boopis*; the two remaining lobes nearly as in that species.

Length of a large male 21.5 mm., of a female 22.5 mm.

Remarks.— *N. flexipes* differs in general aspect much from *N. boopis*, but it would be a mistake to establish a new genus for its reception, because both species agree with each other in all characters of real generic value. It may be mentioned here that even in less than half-grown specimens the carapace has no vestige of any tooth on the lateral margins.

Distribution.— This species was established on two specimens from the Southern equatorial current in the Atlantic. The Copenhagen Museum possesses specimens from two places in the North Atlantic, viz. Lat. 31° 30′ N., long. 21° 16′ W., and Lat. 24° 3′ N., long. 25° 0′ W. It is unknown from the Indian Ocean and the Western Pacific, but according to the long list of Stations it is common in the major part of the area explored in 1904–5 in the East Pacific, viz. between Lat. 9° 45′ N., and Lat. 25° 27′ S. Ortmann has recorded it from two Stations in the same area, viz. off Panama at Lat. 6° 21′ N., and at Lat. 0° 36′ N., long. 82° 45′ W. The specimens in the Copenhagen Museum were

taken at the surface, but the occurrence there must certainly be rare, as all specimens secured in the Pacific are marked "300 fms. to surface" or, in some instances, the instrument employed had been sunk to greater depths.

32. **Nematobrachion sexspinosus** H. J. Hansen.

Plate 10, fig. 6a; Plate 11, figs. 1a–1i.

1911. *Nematobrachion sexspinosus* H. J. Hansen, Bull. Mus. Océan. Monaco, no. 210, p. 51.

Sta. 4699. Dec. 25, 1904. Lat. 21° 39.5′ S., long. 104° 29.8′ W. 300 fms. to surface. 2 adult males.

Description.— Body somewhat more clumsy than in *N. flexipes*, otherwise rather similar in general aspect.— Frontal plate nearly as in *N. flexipes*, produced in a compressed, proximally somewhat deep (fig. 1a), thin, acute, moderately long rostrum; the dorsal keel about as in the two other species.

Eyes black, conspicuously larger and especially proportionately longer than in *N. flexipes*, otherwise as in that species. The antennulae essentially as in the last-named species, excepting that the process at the outer distal angle of second joint (figs. 1b and 1c) is shaped as a large, oblong, subtriangular plate with the end acute and a little acuminate.— The antennae with the squama and the distal peduncular joint of the endopod as in *N. flexipes*.

The maxillulae (Plate 10, fig. 6a) have the distal lobe somewhat broader than the proximal and scarcely longer at the upper margin than broad; the palp is very long, considerably longer than the lobe of third joint and moderately slender; a pseudexopod (pex) is present as an oblong-oval, somewhat small plate which nevertheless reaches a little beyond the outer margin of third joint.— The maxillae (fig. 1d) with the main part only very little longer than broad; the palp is conspicuously smaller than in the two preceding species, distinctly shorter than the breadth of the lobe from third joint and somewhat less than twice as long as broad.— Second pair of thoracic legs with fifth joint scarcely longer than the sixth.

The abdominal segments without dorsal spines excepting the fourth and fifth segments, each of which has three sharp teeth projecting from the hind margin at some distance from each other (figs. 1e and 1f), and the median tooth or process is conspicuously larger than the sublateral teeth. The lateral plates of the five anterior segments with the postero-lateral angle acute and those of fifth segment produced considerably backwards (fig. 1e).— The uropods as in *N. flexipes*, but the telson with 6–8 pairs of dorsal saw-like teeth.

The copulatory organs (figs. 1g–1i) are rather similar to those of *N. boopis*,

but the three large processes show some differences. The terminal process is thickened at the base, but this thicker part does not, as in *N. boopis*, constitute a nearly right angle with the following more slender portion; furthermore the distal, expanded part is only half of the entire process, thus proportionately shorter but broader, more expanded, than in *N. boopis*, with the inner margin nearly straight and the long terminal margin somewhat incised at the middle and raised on the posterior side (fig. 1h); from the outer side (fig. 1i) this raised part is seen to be the terminal portion bent strongly backwards and forming a right angle with the posterior surface. The proximal process has its distal half regularly and semicircularly curved with the very short terminal part a little expanded and bent considerably forwards as a minute triangle (fig. 1h). The lateral process is slender and unusually long (fig. 1g), somewhat sinuate and with the incurved distal part short.

Length of the largest male 23 mm.

Remarks.— This species is interesting. In general aspect it is somewhat similar to *N. flexipes*, though conspicuously more clumsy, but by the structure of the copulatory organs and the serration on the dorsal side of the telson it is more nearly related to *N. boopis*; it differs from both species by the maxillulae which possess a real pseudexopod.

Distribution.— *N. sexspinosus* seems to be rare but widely distributed. In the enormous amount of material studied from many sources and all oceans I have found but three specimens, all males, viz. two from the East Pacific and the third from the northern temperate Atlantic (Monaco, Sta. 2105).

STYLOCHEIRON G. O. Sars (1883).

To Sars's diagnosis of this aberrant genus some additions and corrections may be made.

The carapace is always without denticles on the lateral margin.

The antennulae have in the females the second and especially the third pedunculer joint slender and long, frequently even extremely long, while in the males these joints, and especially the third, are conspicuously shorter and much or very much thicker; the upper flagellum is shorter than the lower and both flagella consist of 6–10 joints, most of them proportionately long; in the females the joints are slender and round, but in the males the major distal part of each flagellum is in most species conspicuously flattened and frequently expanded, in the upper flagellum depressed, in the lower compressed; the basal joint of

the lower flagellum is long, in the male oblong-triangular, being much thickened towards the base. The peduncle of the endopod of the antennae reaches considerably beyond the end of the squama — a feature not found in any other genus — and its penultimate joint is very elongate, much longer than the terminal. The maxillae have the fourth joint either very small or badly defined, and the inner margin of both lobes is without the usual incision.

In the females the endopod of fifth pair of thoracic legs is moderately long, three-jointed, the endopod of sixth pair much larger than the small exopod and two-jointed; in the males the endopod of sixth pair is always wanting, while in fifth pair it seems to be wanting (f. inst. in *S. longicorne*) or developed as in the female (in *S. maximum*).

The copulatory organs of first pleopods have the median lobe coalesced with the inner lobe to near the end of the latter, while the former is oblong, simple, and distally rounded; the processes are small in proportion to the size of the whole organ; the spine-shaped process is curved and shaped as in several other genera, while the two other processes are at most a little curved; the lateral process is placed rather near or very near the base of the inner margin of the lobe, and an additional process is always wanting. The auxiliary lobe is placed on the inner side of the setiferous lobe and sometimes very reduced.

The genus comprises nine species, eight of which are represented in the "Albatross" collection; the only species not present is *S. insulare* H. J. H., hitherto known only from the Indian Archipelago. As to the geographical distribution numerous statements in the literature are discarded as untrustworthy, because *S. affine* H. J. H. and *S. microphthalma* H. J. H. were not separated from *S. suhmii* and this last-named species sometimes was not distinguished from *S. longicorne*. In a similar way *S. maximum* H. J. H. (1908) was not distinguished from *S. abbreviatum*.

a. *Species only with lateral setae on the penultimate joint of the elongate pair of legs.*

33. **Stylocheiron carinatum** G. O. Sars.

Plate 11, figs. 2a–2b.

1883. *Stylocheiron carinatum* G. O. Sars, Forh. Vid. Selsk. Christiania for 1883, no. 7, p. 31.
1885. *Stylocheiron carinatum* G. O. Sars, Challenger Rept., **13**, p. 137; pl. 26.
1910. *Stylocheiron carinatum* H. J. Hansen, Siboga-Exp., **37**, p. 113, pl. 16, figs. 1a–1h.

Sta. 4611. Oct. 18, 1904. Lat. 10° 33′ N., long. 88° 30′ W. Surface. 69 specimens.
Sta. 4613. Oct. 19, 1904. Lat. 9° 45′ N., long. 86° 20′ W. 300 fms. to surface. 1 specimen.
Sta. 4634. Nov. 4, 1904. Lat. 4° 35.4′ N., long. 83° 32.3′ W. 300 fms. to surface. 27 specimens.
Sta. 4635. Nov. 4, 1904. Lat. 3° 52.5′ N., long. 84° 14.3′ W. Surface. 274 specimens.
Sta. 4640. Nov. 6, 1904. Lat. 0° 39.4′ S., long. 88° 11′ W. Surface. 6 specimens.

Sta. 4644. Nov. 7, 1904. Lat. 2° 13.3′ S., long. 89° 12.2′ W. Surface. 5 specimens.
Sta. 4646. Nov. 8, 1904. Lat. 4° 1.6′ S., long. 89° 16.3′ W. 300 fms. to surface. 3 specimens.
Sta. 4661. Nov. 15, 1904. Lat. 10° 17′ S., long. 88° 2′ W. 300 fms. to surface. 1 specimen.
Sta. 4663. Nov. 16, 1904. Lat. 11° 20.3′ S., long. 88° 55.2′ W. Surface. 1 specimen.
Sta. 4665. Nov. 17, 1904. Lat. 11° 45′ S., long. 86° 5.2′ W. 300 fms. to surface. 3 specimens.
Sta. 4679. Dec. 7, 1904. Lat. 17° 26.1′ S., long. 86° 46.5′ W. 300 fms. to surface. 4 specimens.
Sta. 4681. Dec. 8, 1904. Lat. 18° 47.1′ S., long. 89° 26′ W. 300 fms. to surface. 3 specimens.
Sta. 4682. Dec. 8, 1904. Lat. 19° 7.6′ S., long. 90° 10.6′ W. Surface. 1 specimen.
Sta. 4687. Dec. 11, 1904. Lat. 22° 49.5′ S., long. 97° 30.6′ W. { 300 fms. to surface. 1 specimen. / 2125 fms. to surface. 1 specimen.
Sta. 4689. Dec. 12, 1904. Lat. 24° 5′ S., long. 100° 20′ W. 300 fms. to surface. 1 specimen.
Sta. 4699. Dec. 25, 1904. Lat. 24° 39.5′ S., long. 101° 29.8′ W. 300 fms. to surface. 2 specimens.
Sta. 4701. Dec. 26, 1904. Lat. 19° 11.5′ S., long. 102° 24′ W. 300 fms. to surface. 3 specimens.
Sta. 4702. Dec. 26, 1904. Lat. 18° 39.5′ S., long. 102° W. Surface. 1 specimen.
Sta. 4705. Dec. 28, 1904. Lat. 15° 5.3′ S., long. 99° 19′ W. 300 fms. to surface. 5 specimens.
Sta. 4707. Dec. 29, 1904. Lat. 12° 33.2′ S., long. 97° 42′ W. 300 fms. to surface. 2 specimens.
Sta. 4709. Dec. 30, 1904. Lat. 10° 15.2′ S., long. 95° 40.8′ W. 300 fms. to surface. 2 specimens.
Sta. 4710. Dec. 30, 1904. Lat. 9° 30.5′ S., long. 95° 8.3′ W. Surface. 2 specimens.
Sta. 4713. Jan. 1, 1905. Lat. 5° 35.3′ S., long. 92° 24.6′ W. 300 fms. to surface. 2 specimens.
Sta. 4715. Jan. 2, 1905. Lat. 2° 40.4′ S., long. 90° 19.3′ W. 300 fms. to surface. 2 specimens.
Sta. 4716. Jan. 2, 1905. Lat. 2° 18.5′ S., long. 90° 2.6′ W. 600 fms. to surface. 2 specimens.
Sta. 4718. Jan. 13, 1905. Lat. 5° 32.4′ S., long. 99° 32.2′ W. Surface. 1 specimen.
Sta. 4719. Jan. 14, 1905. Lat. 6° 29.8′ S., long. 101° 16.8′ W. 300 fms. to surface. 12 specimens.
Sta. 4721. Jan. 15, 1905. Lat. 8° 7.5′ S., long. 104° 10.5′ W. 300 fms. to surface. 1 specimen.
Sta. 4722. Jan. 16, 1905. Lat. 9° 31′ S., long. 106° 30.5′ W. 300 fms. to surface. 10 specimens.
Sta. 4724. Jan. 17, 1905. Lat. 11° 13.4′ S., long. 109° 39′ W. 300 fms. to surface. 4 specimens.
Sta. 4727. Jan. 18, 1905. Lat. 13° 03′ S., long. 112° 41.9′ W. Surface. 1 specimen.
Sta. 4728. Jan. 19, 1905. Lat. 13° 47.5′ S., long. 114° 21.6′ W. 300 fms. to surface. 6 specimens.
Sta. 4730. Jan. 20, 1905. Lat. 15° 7′ S., long. 117° 1.2′ W. 300 fms. to surface. 1 specimen.
Sta. 4734. Jan. 22, 1905. Lat. 17° 36′ S., long. 122° 35.6′ W. 300 fms. to surface. 1 specimen.
Sta. 4740. Feb. 11, 1905. Lat. 9° 2.1′ S., long. 123° 20.1′ W. 300 fms. to surface. 4 specimens.

Furthermore this species was taken by the "Albatross" at two Stations in 1899 and 1900, and Dr. Agassiz took it several times in 1897 at the Fiji Islands.

Sta. 3681. Aug. 27, 1899. Lat. 28° 23′ N., long. 126° 57′ W. 100 fms. 1 specimen. "Albatross."
Hyd. Sta. 3998 (236). Jan. 28, 1900. Lat. 6° 34′ N., long. 170° 59′ W. Surface; electric light. 1 specimen. "Albatross."
Fiji Islands. Ringold Channel, lee side, Nukusemanu Reef. Nov. 23, 1897. 50 fms. 11 specimens
Fiji Islands. Kimbombo, Nov. 25, 1897. 40 fms. 9 specimens.
Fiji Islands. 3 m. South of Namuka. Dec. 10, 1897. 50 fms. 9 specimens.
Fiji Islands. 6 m. South of Suva. Dec. 10, 1897. 100 fms. 6 specimens.
Fiji Islands. 5 m. South of Suva lightship. Dec. 10, 1897. 100 fms. 200 specimens.
Fiji Islands. 3 m. South of Suva lightship. Dec. 11, 1897. 100 fms. 20 specimens.
Fiji Islands. 3 m. South of Suva lightship. Dec. 16, 1897, 75 fms. 1 specimen.
Fiji Islands. 5 m. South of Suva lightship. Dec. 16, 1897. 100 fms. 8 specimens.
Fiji Islands. 5 m. South of Suva. 100–25 fms. 9 specimens.
Fiji Islands. 5 m. South of Suva. 25 fms. 3 specimens.

For comparison with the maxillulae and maxillae in species of the two other groups of this genus I have given new figures of these appendages. The maxillulae (fig. 2a) have the palp about twice as long as broad and among its terminal setae a few are solid. The maxillae (fig. 2b) are characteristic; their basal part, the first joint, is unusually long; the proximal lobe has its terminal margin very

short as compared with that of the distal lobe which is somewhat convex; the fourth joint is well defined but very small and nearly more than twice as broad as long; the exopod is badly defined and distally without any produced, free part.

The largest specimen, a female, measures 12 mm. in length, but adult specimens of both sexes are generally only 8–10 mm. long.

Remarks.— More than half-grown to full-grown specimens of this small species are easily distinguished from very young specimens of *S. abbreviatum* of similar size by the antennal squama, which in *S. carinatum* is moderately broad to the end and never reaches the middle of third joint of the antennular peduncle, while in *S. abbreviatum* the squama tapers conspicuously towards the end and reaches to near the distal end of third antennular joint. This difference is useful when the elongate second pair of legs, which differs extremely in the two species, has been lost.

It may be mentioned that a specimen from Sta. 4719 has an Epicarid fixed between the eyes, and that a male from Sta. 4724 has an Epicarid on the carapace a little from its front margin.

Distribution.— The long list of Stations in the East Pacific shows that *S. carinatum* is common in the major part of the area explored, but is wanting in a broad longitudinal belt along the coast of America from the line southwards. It is widely distributed in the Pacific according to the facts given above as to its capture in 1899 and 1900 by the "Albatross," in 1897 at the Fiji Islands by Dr. Agassiz, and Ortmann has recorded it from Lat. 28° 31′ N., long. 141° 47′ W., the Hawaiian Islands. Sars has recorded it from off Kandavu, Fiji Islands, and from off Mindanao, Philippine Islands. The "Siboga" captured it at a large number of Stations in the Indian Archipelago. It is also widely distributed in the Atlantic; Sars recorded it from "South Atlantic," Ortmann from the Sargasso Sea, the Southern equatorial current and the Brazil current; finally the Copenhagen Museum possesses it from Lat. 7° N., long. 30° W., from Lat. 17° 46′ N., long. 51° 12′ W., and from Lat. 20° 24′ N., long. 83° W. (West Indies). It has not infrequently been taken at the surface, and more than once in large numbers.

b. *Species with the elongate pair of legs terminating in false chelae having no real immovable finger but a very long and strong terminal, distally curved spine (and near this two shorter spines) on the penultimate joint.*

31. **Stylocheiron microphthalma** H. J. Hansen

1910. *Stylocheiron microphthalma* H. J. Hansen, Siboga-Exp., **37**, p. 117, pl. 16, figs. 3a–3d.

Sta. 4722. Jan. 16, 1905. Lat. 9° 31′ S., long. 106° 30.5′ W. 300 fms. to surface. 1 specimen.
Sta. 4740. Feb. 11, 1905. Lat. 9° 2.4′ S., long. 123° 20.4′ W. 300 fms. to surface. 1 specimen.

Besides it has been captured two times by Dr. Agassiz in 1897: —

Fiji Islands. 5 m. South of Suva. Dec. 10, 1897. 1 specimen.
Fiji Islands. 3 m. South of Suva. Dec. 11, 1897. 100 fms. 2 specimens, ♂ and ♀.

The largest female (from Sta. 4722) is 6.7 mm. long; the male is 5.8 mm.

Distribution.— This small species was hitherto known only from five of the "Siboga" Stations in the Indian Archipelago.

35. **Stylocheiron suhmii** G. O. Sars.

Plate 11, figs. 3a–3b.

1883. *Stylocheiron suhmii* G. O. Sars, Forh. Vid. Selsk. Christiania for 1883, no. 7, p. 31.
1885. *Stylocheiron suhmii* G. O. Sars, Challenger Rept., **13**, p. 142, pl. 27, figs. 1–4.

Sta. 4687. Dec. 11, 1904. Lat. 22° 49.5′ S., long. 97° 30.6′ W. 300 fms. to surface. 3 specimens.
Sta. 4691. Dec. 13, 1904. Lat. 25° 27.3′ S., long. 103° 29.3′ W. 300 fms. to surface. 1 specimen.
Sta. 4732. Jan. 21, 1905. Lat. 16° 32.5′ S., long. 119° 59′ W. 300 fms. to surface. 1 specimen.
Sta. 4734. Jan. 22, 1905. Lat. 17° 36′ S., long. 122° 35.6′ W. 300 fms. to surface. 1 specimen.

Besides it has been captured nine times by Dr. Agassiz in 1897: —

Fiji Islands. Ringold Channel, lee side, Nukusimanu Reef. Nov. 23, 1897. 50 fms. 1 specimens.
Fiji Islands. 3 m. South of Nanuka. Dec. 10, 1897. 50 fms. 1 specimen.
Fiji Islands. 6 m. South of Suva. Dec. 10, 1897. 100 fms. 6 specimens.
Fiji Islands. 5 m. South of Suva. Dec. 10, 1897. 100 fms. 16 specimens.
Fiji Islands. 3 m. South of Suva lightship. Dec. 11, 1897. 100 fms. 1 specimen.
Fiji Islands. 3 m. South of Suva lightship. Dec. 16, 1897. 75 fms. 1 specimen.
Fiji Islands. 5 m. South of Suva. Dec. ?, 1897. 25 fms. 1 specimen.
Fiji Islands. 5 m. South of Suva. Dec. ?, 1897. 100–25 fms. 1 specimen.
Fiji Islands. Dec. 16, 100 fms. 12 specimens.

Description.— Frontal plate rather long, in the adult females terminating in a long, distally very slender rostrum, while in adult males the rostrum is very short or scarcely developed. The dorsal keel on the gastric area moderately high, anteriorly very sloping.

The eyes are high, at least twice as high as broad (fig. 3a), somewhat pyriform, with the lower section from more than half as broad again to a little less than twice as broad as the upper; the upper section projects much above the upper end of the stalk and, seen from the side, has only three crystal cones in a transverse row.— The antennulae in the female nearly as in *S. longicorne*; the peduncle is longer than the carapace, with the two distal joints very slender and the third about one third as long again as the second; the upper flagellum is slightly shorter than the lower and about as long as the peduncle; both flagella

are extremely thin. In the male antennulae the two distal peduncular joints are somewhat shorter and much thicker than in the female; the upper flagellum is slightly longer than the peduncle and conspicuously shorter than the lower; both flagella distinctly thicker than in the female, but any expansion or flattening is not distinct, and the joints, probably eight, are difficult to count.— The antennal squama is very long and narrow, 13–14 times as long as broad a little behind the base of the marginal tooth; in the female it scarcely reaches to the middle of third joint of the antennular peduncle, in the male scarcely to the end of the same joint.— The false chelae of second pair of legs in the main as in *S. affine*.

Sixth abdominal segment (fig. 3b) a little less than twice as long as deep, with the lower margin curved moderately strongly upwards towards the end.— The rami of the uropods nearly equal in length, reaching scarcely the end of telson.

Length of the males 5–5.5 mm., of the females 5–5.8 mm.

Remarks.— It may be seen from the description that this species is very closely allied to *S. affine* H. J. H. and *S. longicorne* G. O. S. But it is easily distinguished from both by the eyes which, seen from the side, are slender, extend very much beyond the upper end of the stalk and show only three crystal cones in the transverse row.

Distribution.— The type of Sars, preserved in the British Museum, is from the Pacific, North of New Guinea. His specimen from "off Luzon, China Sea," is damaged, but seems to belong to this species. Whether the specimen from his third locality, "Samboangan to Ho-Ho, Philippines" in reality belonged to this species cannot be decided, as it seems to be lost. I discard all other statements in the literature before 1910 as uncertain, because several and perhaps many among them belong to other species; it may only be stated here that the Monaco material from the temperate North Atlantic comprises a number of specimens.

36. **Stylocheiron affine** H. J. Hansen.

1910. *Stylocheiron affine* H. J. Hansen, Siboga-Exp., **37**, p. 118, pl. 16, figs. 4a–4d.

Sta. 4609.	Oct. 18, 1904.	Lat. 11° 05′ N., long. 89° 35′ W.	300 fms. to surface. 1 specimen.
Sta. 4613.	Oct. 19, 1904.	Lat. 9° 45′ N., long. 86° 20′ W.	300 fms. to surface. 2 specimens.
Sta. 4634.	Nov. 4, 1904.	Lat. 4° 35.4′ N., long. 83° 32.3′ W.	300 fms. to surface. 16 specimens.
Sta. 4637.	Nov. 5, 1904.	Lat. 1° 31′ N., long. 87° 32′ W.	300 fms. to surface. 9 specimens.
Sta. 4638.	Nov. 6, 1904.	Lat. 0° 27′ N., long. 87° 13′ W.	300 fms. to surface. 4 specimens.
Sta. 4646.	Nov. 8, 1904.	Lat. 4° 1.6′ S., long. 89° 13.3′ W.	300 fms. to surface. 3 specimens.
Sta. 4652.	Nov. 11, 1904.	Lat. 5° 44.7′ S., long. 82° 39.5′ W.	Surface. 1 specimen. 100 fms. to surface. 2 specimens. 200 fms. to surface. 1 specimen. 400 fms. to surface. 1 specimen.

Sta. 1663. Nov. 16, 1901. Lat. 11° 20.3′ S., long. 88° 55.2′ W. 300 fms. to surface. 2 specimens.
Sta. 1709. Dec. 30, 1904. Lat. 10° 15.2′ S., long. 95° 40.8′ W. 300 fms. to surface. 2 specimens.
Sta. 4717. Jan. 13, 1905. Lat. 5° 10′ S., long. 98° 56′ W. 300 fms. to surface. 1 specimen.
Sta. 4722. Jan. 16, 1905. Lat. 9° 31′ S., long. 106° 30.5′ W. 300 fms. to surface. 1 specimen.
Sta. 4728. Jan. 19, 1905. Lat. 13° 47.5′ S., long. 114° 21.6′ W. 300 fms. to surface. 1 specimen.
Sta. 4740. Feb. 11, 1905. Lat. 9° 2.1′ S., long. 123° 20.1′ W. 300 fms. to surface. 2 specimens.

Besides it was taken by Dr. Agassiz in 1897: —

Fiji Islands. 5 m. South of Suva. Dec. 10, 1897. 100 fms. 1 specimen.

Distribution. — *S. affine* was captured by the "Siboga" at a number of Stations in the Indian Archipelago.

37. **Stylocheiron longicorne** G. O. Sars.

Plate 11, figs. 4a–4b.

1883. *Stylocheiron longicorne* G. O. Sars, Forh. Vid. Selsk. Christiania for 1883, no. 7, p. 32.
1885. *Stylocheiron longicorne* G. O. Sars, Challenger Rept., **13**, p. 144, pl. 27, fig. 5.
1910. *Stylocheiron longicorne* H. J. Hansen, Siboga-Exp., **37**, p. 120, pl. 16, figs. 5a–5b.

Sta. 4605. Oct. 17, 1904. Lat. 12° 21′ N., long. 92° 13′ W. 300 fms. to surface. 1 specimen.
Sta. 4637. Nov. 5, 1904. Lat. 1° 31′ N., long. 86° 32′ W. 300 fms. to surface. 5 specimens.
Sta. 4679. Dec. 7, 1904. Lat. 17° 26.4′ S., long. 86° 46.5′ W. 300 fms. to surface. 1 specimen.
Sta. 4685. Dec. 10, 1904. Lat. 21° 36.2′ S., long. 94° 56′ W. 300 fms. to surface. 1 specimen.
Sta. 4687. Dec. 11, 1904. Lat. 22° 49.5′ S., long. 97° 30.6′ W. { 300 fms. to surface. 2 specimens. / 2125 fms. to surface. 1 specimen.
Sta. 4689. Dec. 12, 1904. Lat. 24° 5′ S., long. 100° 20′ W. 300 fms. to surface. 1 specimen.
Sta. 4691. Dec. 13, 1904. Lat. 25° 27.3′ S., long. 103° 29.3′ W. 300 fms. to surface. 5 specimens.
Sta. 4695. Dec. 23, 1904. Lat. 25° 22.4′ S., long. 107° 45′ W. 300 fms. to surface. 3 specimens.
Sta. 4699. Dec. 25, 1904. Lat. 21° 39.5′ S., long. 104° 29.8′ W. 300 fms. to surface. 4 specimens.
Sta. 4701. Dec. 26, 1904. Lat. 19° 11.5′ S., long. 102° 24′ W. 300 fms. to surface. 2 specimens.
Sta. 4705. Dec. 28, 1904. Lat. 15° 5.3′ S., long. 99° 19′ W. 300 fms. to surface. 1 specimen.
Sta. 4709. Dec. 30, 1904. Lat. 10° 15.2′ S., long. 95° 40.8′ W. 300 fms. to surface. 1 specimen.
Sta. 4721. Jan. 15, 1905. Lat. 8° 7.5′ S., long. 104° 10.5′ W. 300 fms. to surface. 1 specimen.
Sta. 4724. Jan. 17, 1905. Lat. 11° 13.4′ S., long. 109° 39′ W. 300 fms. to surface. 3 specimens.
Sta. 4728. Jan. 19, 1905. Lat. 13° 47.5′ S., long. 114° 21.6′ W. 300 fms. to surface. 5 specimens.
Sta. 4730. Jan. 20, 1905. Lat. 15° 7′ S., long. 117° 1.2′ W. 300 fms. to surface. 5 specimens.
Sta. 4734. Jan. 22, 1905. Lat. 17° 36′ S., long. 122° 35.6′ W. 300 fms. to surface. 1 specimen.
Sta. 4736. Jan. 23, 1905. Lat. 19° 0.4′ S., long. 125° 5.4′ W. 300 fms. to surface. 1 specimen.

Figs. 4a–4b represent the left maxillula and left maxilla, giving an idea of these appendages in a species of this group of the genus. The maxillulae differ from those in *S. carinatum* only in minor particulars; thus the third joint is comparatively broader and the palp is broader with a much larger number of setae. The maxillae (fig. 4b) are more interesting; the fourth joint is not at all marked off, not even at the inner margin, from the third joint with its lobe, but judging from the place of the distal end of the insertion of the exopod the fourth joint is moderately long; the exopod is well-marked off and distally produced with a free lobe beyond the end of the articulation.

This species varies much in size; the largest female (from Sta. 4699) is 13 mm. long.

Remarks.— It may be mentioned that one of the specimens from Sta. 4637 has an Epicarid on the lower side of the thorax between the posterior legs.

Distribution.— The list of Stations shows that *S. longicorne* is rather common in some parts of the area explored in 1904–1905, but seems to be wanting in other parts, for instance near the Galapagos, in a rather large field Southwest and South of these Islands, and in a broad longitudinal belt along the coast of South America. The specimen from the Hawaiian Islands referred (1905) by Ortmann to *S. suhmii* belongs to *S. longicorne*. This species was gathered by the "Siboga" at nine Stations in the Indian Archipelago. Sars's type was taken South of the Cape of Good Hope, and Sars states that he had some specimens from the Mediterranean. In the Atlantic it is evidently not uncommon and has been captured as far northwards as South of Iceland, Lat. 63° 08′ N., long. 21° 30° W. ("Ingolf" Exp.).— It has very rarely been taken at the surface.

38. **Stylocheiron elongatum** G. O. Sars.

1883. *Stylocheiron elongatum* G. O. Sars, Forh. Vid. Selsk. Christiania for 1883, no. 7, p. 32.
1885. *Stylocheiron elongatum* G. O. Sars, Challenger Rept., **13**, p. 146, pl. 27, figs. 6–10.

Sta. 4689. Dec. 12, 1904. Lat. 24° 5′ S., long. 100° 20′ W. 300 fms. to surface. 1 specimen.

This slender species is easily recognized by its extremely long sixth abdominal segment. Sars's description and figures are imperfect as to some particulars, but a new representation based on good material must be postponed for the report on the Monaco material.

Distribution.— Only the single above-named specimen is hitherto known from the Pacific, and it is unknown from the Indian Ocean. Sars's two specimens were from the South Atlantic. Ortmann had it from several areas in the Atlantic, viz.:—the Florida current, Sargasso Sea, Northern equatorial current, Guinea current and Southern equatorial current. In 1905 I enumerated a number of localities in the Eastern Atlantic between Lat. 36° 17′ N. and Lat. 27° 43′ N.

c. *Species with the elongated pair of legs terminating in real chelae with a well-developed immovable finger from the penultimate joint.*

39. **Stylocheiron abbreviatum** G. O. Sars.

Plate 11, figs. 5a–5f.

1883. *Stylocheiron abbreviatum* G. O. Sars, Forh. Vid. Selsk. Christiania for 1883, no. 7, p. 33.
1885. *Stylocheiron abbreviatum* G. O. Sars, Challenger Rept., **13**, p. 147, pl. 27, figs. 12–13.
1896. *Stylocheiron chelifer* Chun, Bibl. Zool., **7**, heft. 19, p. 162, taf. 1, figs. 1–8.
1910. *Stylocheiron abbreviatum* H. J. Hansen, Siboga-Exp., **37**, p. 122.

Sta. 4679. Dec. 7, 1904. Lat. 17° 26.4′ S., long. 86° 46.5′ W. 300 fms. to surface. 3 specimens.
Sta. 4681. Dec. 8, 1904. Lat. 18° 47.1′ S., long. 89° 26′ W. 300 fms. to surface. 2 specimens.
Sta. 4685. Dec. 10, 1904. Lat. 21° 36.2′ S., long. 94° 56′ W. 300 fms. to surface. 1 specimen.
Sta. 4687. Dec. 11, 1904. Lat. 22° 49.5′ S., long. 97° 30.6′ W. 300 fms. to surface. 1 specimen.
Sta. 4689. Dec. 12, 1904. Lat. 24° 5′ S., long. 100° 20′ W. 300 fms. to surface. 1 specimen.
Sta. 4691. Dec. 13, 1904. Lat. 25° 27.3′ S., long. 103° 29.3′ W. 300 fms. to surface. 3 specimens.
Sta. 4695. Dec. 23, 1904. Lat. 25° 22.4′ S., long. 107° 15′ W. 300 fms. to surface. 1 specimen.
Sta. 4699. Dec. 25, 1904. Lat. 21° 39.5′ S., long. 104° 29.8′ W. 300 fms. to surface. 1 specimen.
Sta. 4705. Dec. 28, 1904. Lat. 15° 5.3′ S., long. 99° 19′ W. 300 fms. to surface. 2 specimens.
Sta. 4707. Dec. 29, 1904. Lat. 12° 33.2′ S., long. 97° 42′ W. 300 fms. to surface. 5 specimens.
Sta. 4709. Dec. 30, 1904 Lat. 10° 15.2′ S., long. 95° 40.8′ W. 300 fms. to surface. 1 specimen.
Sta. 4719. Jan. 14, 1905. Lat. 6° 29.8′ S., long. 101° 16.8′ W 300 fms. to surface. 1 specimen.
Sta. 4724. Jan. 17, 1905. Lat. 11° 13.4′ S., long. 109° 39′ W. 300 fms. to surface. 1 specimen.
Sta. 4730. Jan. 20, 1905. Lat. 15° 7′ S., long. 117° 1.2 W. 300 fms. to surface. 1 specimen.
Sta. 4734 Jan. 22, 1905. Lat. 17° 36′ S., long. 122° 35.6′ W. 300 fms. to surface. 1 specimen.

Besides I have it from the following localities:—

Sta. 3681. Aug. 27, 1899. Lat. 28° 23′ N., long. 126° 57′ W. 100 fms. 2 specimens. "Albatross."
Fiji Islands. 6 m. South of Suva lightship. Dec. 11, 1897. 150 fms. 1 specimen. A. Agassiz.
Fiji Islands. 3 m. South of Suva lightship. Dec. 11, 1897. 100 fms. 1 specimen. A. Agassiz.
Fiji Islands. 3 m. South of Suva lightship. Dec. 11, 1897. 150 fms. 1 specimen. A. Agassiz.

In the "Siboga" paper I pointed out the main differences between this species and *S. maximum* H. J. H. But as no adult male was found in the "Siboga" material, as the copulatory organs have never been figured, and the interesting antennulae in adult males are unknown I give some figures of these and other parts with the necessary description; the preservation of the females in the collection does not allow corresponding figures of the antennular flagella in this sex.

Fig. 5a exhibits the anterior part of a male. The eye has the shape characteristic in this species; it is nearly pyriform, the lower area being somewhat or a little less than twice as broad, but more than twice as deep as the upper.— In the female the antennulae have the two distal peduncular joints slender as in the other species of the genus, and the third joint is conspicuously, though not much, longer than the second; the flagella are slender with round joints. In the male the second and especially the third joint of the antennular peduncles is much thickened, the second slightly shorter than in the female, but the third slightly shorter than the second and gradually more thickened towards the end. The male antennular flagella are very characteristic (figs. 5b and 5c); the upper flagellum is somewhat shorter than the peduncle (fig. 5a), 6-jointed; the four proximal joints rather slender, but the first a little expanded towards the base, the second extremely short, and the fourth is distinctly depressed and begins to be a little expanded; the two distal joints together considerably longer than the sum of the four proximal joints, flattened, the fifth distally much expanded inwards with the inner margin of the broadest part finely serrate, the sixth

joint oblong-triangular, a little longer than the fifth and finely serrate along the inner margin. The lower flagellum is not fully half as long again as the upper, 9-jointed, the basal joint long and extremely thickened towards the base, with a large tuft of innumerable, thin sensory setae; the second joint is extremely short, the third long and slender, the fourth much shorter, compressed, and distinctly widened towards the end, while the five distal joints increase in length to the last, all being besides strongly compressed, with the upper margin finely serrate.

The antennal squama is long, rather narrow, tapers towards the end, with an outer tooth reaching beyond the short, oblique or transverse terminal margin; it reaches in the male to or a little beyond the end of third joint of the antennular peduncle (fig. 5a), in the female beyond the middle of that joint but never to its end; the two distal joints of the special peduncle of the endopod (a^2) are very thin and taken together extremely long, reaching far behind the end of the squama.

The maxillulae (fig. 5d) differ only in minor details from those of *S. longicorne* (fig. 4a) and the same is the case with the maxillae (fig. 5e), the latter being, however, proximally somewhat broader in proportion to the length and have the fourth joint marked off at the inner margin from the lobe of third joint.

Fig. 5f, representing the inner and the median lobe of the copulatory organ, illustrates especially the great difference in thickness between the terminal and the proximal process (p^2. and p^3.) which, as pointed out in the "Siboga" paper, is the best specific character in this organ for *S. abbreviatum* in contradistinction to *S. maximum*. (The copulatory organ of the latter species has been figured in the paper named).

Length of a good-sized male 15 mm., of a female 16 mm.

Distribution.— Most of the localities enumerated in the literature are not trustworthy, because the next species has frequently been confounded with *S. abbreviatum*. Sars's type is from the tropical Atlantic, and the Copenhagen Museum possesses two specimens from the same area, viz. Lat. 23° 31′ N., long. 22° 41′ W., and Lat. 18° S., long. 2° W.; a number of specimens are at hand from the area in the northern temperate Atlantic explored by the Prince of Monaco. Furthermore it has been captured at some Stations in the Indian Archipelago by the "Siboga." It is widely distributed in the Pacific; according to the list of Stations, Expedition of 1904–1905, it is rather common in the southern part in the area explored, going northwards to about Lat. $6\frac{1}{2}$° S.; but

furthermore it was taken at the Fiji Islands and in the North Pacific; Ortmann's specimen from the Hawaiian Islands belongs to this species, while his specimen from off Galera Point is too poor for determination. The species has very rarely been taken at the surface.

40. **Stylocheiron maximum** H. J. Hansen.

1908. *Stylocheiron maximum* H. J. Hansen, The Danish Ingolf-Exped., **3**, 2, p. 92.
1910. *Stylocheiron maximum* H. J. Hansen, Siboga-Exp., **37**, p. 121, pl. 16, figs. 6a–6d.

Sta. 4616. Nov. 8, 1904. Lat. 4° 1.6′ S., long. 89° 16.3′ W. 300 fms. to surface. 1 specimen.
Sta. 4679. Dec. 7, 1904. Lat. 17° 26.4′ S., long. 86° 46.5′ W. 300 fms. to surface. 1 specimen.
Sta. 4707. Dec. 29, 1904. Lat. 12° 32.2′ S., long. 97° 42′ W. 300 fms. to surface. 1 specimen.
Sta. 4713. Jan. 1, 1905. Lat. 5° 35.3′ S., long. 92° 21.6′ W. 300 fms. to surface. 1 specimen.
Sta. 4716. Jan. 2, 1905. Lat. 2° 18.5′ S., long. 90° 2.6′ W. 600 fms. to surface. 1 specimen.
Sta. 4724. Jan. 17, 1905. Lat. 11° 13.4′ S., long. 109° 39′ W. 300 fms. to surface. 2 specimens.
Sta. 4742. Feb. 15, 1905. Lat. 0° 3.4′ N., long. 117° 15.8′ W. 300 fms. to surface. 1 specimen.

Remarks.— The material is somewhat poor in quality, most of the specimens being not well preserved and only two, both females, are adult. For this reason a representation of this large and fine species must be postponed.

Distribution.— In the Atlantic *S. maximum* extends northwards to Lat. 61° 49′ N., long. 14° 11′ W., West of the Færoes ("Ingolf" Exp.), and it is not uncommon in the area explored by the Prince of Monaco. Finally it was taken at some few localities in the Indian Archipelago by the "Siboga."

LARVAL STAGES OF EUPHAUSIACEA.

Plate 12.

The collection contains a large number of larvae in various stages of development. But more than two thirds belong to the genus Euphausia and are not very interesting; a smaller number in the later stages of development can be named with certainty, but it is impossible to refer most of them to the forms to which they belong. Sars has given a very detailed account of the metamorphosis of his *Euphausia pellucida*, and though this species — according to his list of synonymy, his figures, and many of his specimens examined by me — comprises at least three allied species, and though it is impossible to decide whether the larvae described and figured by him as stages of *E. pellucida* in reality belong to a single or to two or three closely allied species, his figures and descriptions do give an excellent account of the development of animals of the *krohnii*-group. The time is still remote when it may be possible to give a full account of the metamorphosis of at least several species of the rich genus Euphausia, a task

which, for the others, must always be very difficult, as frequently it will be next to impossible to find specific characters for every stage of every species. As the number of species of the genus Euphausia collected by the Agassiz expedition 1904–1905 is fourteen, and it may be expected that larvae of the majority of these species exist in the material, it will instantly be seen that to solve the difficulties connected with the endeavour to refer the older larval stages to their proper form and then in a similar way to proceed from older to younger stages would have been in most cases at least very great and sometimes or frequently impossible. Under such circumstances I thought it better not to make a hazardous attempt to work out the material of these larvae, with the exception of some few presenting a somewhat peculiar aspect and belonging to a single species. But I thought it useful and safer to describe a number of larvae of five other genera, hoping thereby to give an addition of some little importance to our knowledge of the larvae of this order, especially as I am able to refer most of these larvae to the species in question.

THYSANOPODA sp. (T. MONACANTHA aff.).

Plate 12, figs. 1a–1g.

A. *First Furcilia-Stage* (figs. 1a–1d).— The frontal plate (fig. 1b) very long, nearly as long as broad at the base; its lateral margins proximally concave, more distally convex and then almost straight to the slightly acuminate, acute tip; the upper surface a little concave longitudinally.— The carapace has a fine denticle on the lower margin somewhat before its posterior end (fig. 1a); seen from the side a short, but somewhat high keel, including the dorsal organ, is seen on the upper margin considerably nearer to the posterior margin than to base of the frontal plate.— The eyes are large, yellow with the central part black, but they do not reach beyond the sides of the carapace (fig. 1b), as their stalks are short.— The antennular peduncles short and very robust; first joint extremely broad, with its distal outer process reaching the end of third joint and furnished with fine spines on the inner margin; second joint broader than long with two very long, plumose setae on the inner margin; third joint nearly half as long again as the second and a little longer than broad, with terminal setae and three very long, plumose setae on the inner margin; both flagella are one-jointed, the upper much shorter and thinner than the lower which is a little shorter than the third peduncular joint.— The antennae (figs. 1a and 1b) with both rami one-jointed and terminating in a bundle of extremely long, plumose

setae; outer ramus much shorter than the inner.— The maxillipeds (fig. 1a, mxp.) with the exopod longer than the endopod.— First pair of thoracic legs are only short, simple protuberances, and no distinct vestige of following pairs is observed.

The abdomen (fig. 1a) with the upper part of second segment distinctly elongate and dorsally a little protruding towards the hind margin; sixth segment as long as the sum of the two preceding segments and somewhat longer than deep.— First pair of pleopods shaped as a very oblong, naked joint; the following pleopods visible only as low knots covered by the "epimera."— The uropods (fig. 1e) reach conspicuously beyond the middle of the telson.— Telson almost two and a half times as long as sixth segment, scarcely three and a half times as long as broad and narrower somewhat from the end than at the base; its end (fig. 1d) with seven moderately short, distally very slender spines, and at each side near the end three spines, the distal long and very strong with fine spines along more than the proximal half of its inner margin, the intermediate spine a little less strong but still somewhat longer than the distal and showing similar armature; the proximal spine strong but only one third as long as the next.

Length 3.7 mm.

The two specimens described are from "Albatross" Sta. 4635, November 4, 1904; surface. A third specimen from the same Station is intermediate between the first and the last Furcilia-stage.

B. *Last Furcilia-Stage* (figs. 1e–1g).— The frontal plate (fig. 1f) a little shorter and somewhat broader than in the first Furcilia-stage; the dorsal keel is smaller and situated nearer to the base of the frontal plate than to the posterior margin of the carapace (fig. 1e).— The antennulae are somewhat longer (fig. 1f); the process from first joint reaches the middle of the third joint; the second joint nearly longer than broad; the lower flagellum as long as the third peduncular joint and somewhat longer than the upper flagellum. The antennae and the maxillipeds essentially as in the preceding stage.— The first pair of thoracic legs not longer than the maxillipeds, with the endopod divided into some joints, the exopod very short and two branchial filaments; second pair nearly rudimentary with a four-branched gill; third pair rudimentary with a small three-branched gill.

Second abdominal segment protrudes as in the preceding stage; sixth segment more than half as long again as deep.— First pair of pleopods with both rami present and setiferous but the endopod is very short; second pair a little

shorter with the exopod setiferous but no endopod. Third to fifth pair nearly rudimentary, oblong, with a transverse suture but without setae.— The uropods reach nearly the proximal pair of spines on the terminal part of the telson. This terminal part (fig. 1g) is very different from that of first Furcilia-stage; the terminal margin is convex with only five spines and the median spine longer and stronger than the others, which are a little shorter than in the earlier stage; of the distal lateral spines the intermediate pair are nearly as in the preceding stage (in the single specimen the left spine is normal, the right shorter and without fine marginal spines), the proximal pair are short and slender, while the distal pair are longer and stronger than the intermediate, straight, with only two or three fine spines on the inner margin.

Length of the single specimen 5 mm.

The specimen is from "Albatross" Sta. 4710; December 30, 1904. Surface.

Remarks.— That the two stages described belong to the same species is easily seen from the shape of the frontal plate, the antennulae, the eyes, and the second abdominal segment. It is closely allied to *T. monacantha* Ortm. (*T. agassizii* Ortm.) but can scarcely be that species. The "Siboga" material contained specimens of the last Furcilia-stage, furthermore a young animal in which the process from the two proximal antennular joints had begun to develop — so that this specimen could with absolute certainty be referred to *T. monacantha* — and besides two stages intermediate between the last-named specimen and the last Furcilia-stage, and it is quite sure that all these specimens belong to the same species. But the specimens in the last Furcilia-stage from the "Siboga" differ from the specimen in the Agassiz collection just described by having the body a little shorter and somewhat more clumsy, the eyes somewhat larger, the frontal plate a little different in shape, the second abdominal segment less protruding above and besides showing an interesting difference in the telson. Though the thoracic and abdominal appendages show the same degree of development in the specimens in last Furcilia-stage from both collections, the Agassiz specimen, which is a little longer than those from the "Siboga," has the distal part of the telson less developed than the "Siboga" specimens, as the long postero-lateral spines of the intermediate pair found in the Agassiz specimen are lost in the "Siboga" specimens (Siboga-Exp., **37**, pl. 13, fig. 3g).

It is, I think, very improbable that the differences pointed out between specimens in the last Furcilia-stage from the Indian Archipelago and the tropical East Pacific can be found in larvae of the same species from two distant areas.

And after a renewed examination of the "Siboga" material I consider my interpretation or reference of these animals as quite certain. The above-described larvae must therefore belong to a species allied to *T. monacantha* (*T. agassizii*) and according to my knowledge of young animals of *T. pectinata*, *T. orientalis*, *T. aequalis*, and *T. obtusifrons* they cannot belong to any of these forms, but most probably to *T. cristata* G. O. S., which is larger than *T. monacantha* and agrees with it in having a lateral furrow somewhat above the lower margin of the carapace.

Euphausia distinguenda H. J. Hansen.

Plate 12, figs. 2a–2c.

Last Furcilia-Stage.— Slender.— The frontal plate (fig. 2b) is large, scarcely twice as broad as long, anteriorly very broadly rounded but with a quite minute acute tooth representing the rostrum. The dorsal keel of the carapace situated nearly equally distant from the rostrum and from the posterior margin; it is high, subtriangular, with the front margin rather steep; the tooth situated far behind on the lateral margins of the carapace is large.

The eye-stalks are uncommonly long, almost longer than broad (fig. 2b) and conspicuously longer than deep (fig. 2a).— The antennulae are half developed; the distal process from the first peduncular joint reaches not fully to the end of third joint; the flagella are equal in length, somewhat longer than the sum of the two distal peduncular joints, three-jointed.— The antennae have the exopod somewhat shorter than the endopod and not yet developed as squama.— The maxillipeds with both rami equal in length and the exopod one-jointed.— First pair of thoracic legs twice as long as the maxillipeds; endopod with the full number of joints with only a few short setae at the end; the exopod not quite half as long as the endopod; a minute bipartite branchia is visible. Second pair of legs nearly rudimentary, with a minute branchial rudiment; third pair scarcely visible.

The four anterior pairs of pleopods with both rami setiferous; the exopod as long as the stalk, while the endopod is minute. Fifth pair of pleopods small, naked, with a transverse suture.— Distal part of telson (fig. 2c) with three terminal spines, the intermediate spine somewhat longer than the others, and with three pairs of lateral spines, the distal pair a little longer than and twice as broad as the intermediate, while the proximal pair are minute.

Length of the specimen described and figured 2.8 mm.

The specimen is from the "Albatross" Sta. 4588; October 12, 1904. Surface.

Remarks.— The reference of this larva to *E. distinguenda* H. J. H. is certain, because I have a nearly complete series of the following stages of development and growth up to the adult specimens. The larvae of the stage described are distinguished from those of other species by the combination of possessing a slender body, a high and anteriorly steep dorsal keel and somewhat long eye-stalks. A comparison between the larvae just described with the corresponding stage described and figured by Sars as belonging to *E. pellucida* ("Challenger" Rept., pl. 29, fig. 7 and pl. 30, fig. 40) is not without interest. In certain respects Sars's larva is more, in other features less, developed than the larva of *E. distinguenda*; *E. pellucida* has the second pair of thoracic legs considerably longer than *E. distinguenda*, and the last pair of pleopods with both rami setiferous, while the telson has still seven terminal spines and the antennular flagella are a little less developed than in *E. distinguenda*.— Similar cases of differences in the development between various species of the genus Euphausia have been pointed out in my paper on the Schizopoda of the Belgian Antarctic Expedition.

Nyctiphanes simplex H. J. Hansen.

Plate 12, figs. 3a–3f.

A. *Intermediate Furcilia-Stage* (figs. 3a–3d).— The frontal plate (fig. 3b) very large, somewhat less than twice as broad as long, longitudinally concave and anteriorly cut off, with the front margin about half as long as the basal breadth of the plate and conspicuously concave but not angular at the middle; the antero-lateral angles feebly produced, acute.— The carapace has a well-developed tooth on the lateral margin, while the usual dorsal keel is very short and low, placed a little farther from the end of the frontal plate than from the posterior margin.

The eyes are extremely large with moderately long stalks.— The antennulae are very thick; the process from first peduncular joint reaches beyond the middle of the third; second and third joints slightly longer than broad; the upper flagellum thick, nearly conical, unjointed and a little longer than the lower.— Antennae with the rami subsimilar in shape, but the exopod a little shorter than the endopod.— Maxillipeds (mxp.) with the exopod a little shorter than the endopod.— First pair of thoracic legs scarcely as long as the maxillipeds, with a rudimentary exopod and a small two-branched gill; the endopod has one distinct and two indistinct articulations. Second pair half as long as the first, with a rudimentary branchia; third pair quite rudimentary.

First and second pairs of pleopods with the exopod well developed, seti-

ferous, while the endopod is minute and naked. The three posterior pairs somewhat shorter than the second pair; the exopod well defined, as long as the stalk and without terminal setae.— Sixth abdominal segment somewhat longer than the fifth and rather thick.— The uropods reach a little beyond the middle of telson.— The telson (fig. 3c) is a little broader near the end than at the base. The terminal margin (fig. 3d) transverse, straight, with seven spines, which increase somewhat in length from the median spine outwards and have the proximal major part at each side furnished with minute denticles; the intermediate pair of postero-lateral spines slightly longer and a little less thick than the inner pair, which is more than twice as long as the outer terminal spine; the outer postero-lateral spine less than half as long as the intermediate pair.

Length of the specimen described 3.2 mm.

Last Furcilia-Stage (figs. 3e–3f).— Carapace with frontal plate almost as in the preceding stage.— Antennulae considerably longer, but the process from the first joint is still as long as in the stage described, while the flagella are about as long as the sum of the two distal peduncular joints, setiferous at the end but with articulations very indistinct; the lower flagellum is a little longer and considerably thicker than the upper.— Antennae still as in the intermediate stage.— The endopod of the maxillipeds somewhat longer and thicker than the exopod, with a few feeble articulations.— First pair of thoracic legs considerably developed; the endopod reaches the base of the antennae, is distally setiferous and with the final number of joints; the exopod still unjointed and without setae; the gill with two long branches and one very short branch.— Second pair somewhat less developed than the first, as the endopod is somewhat shorter, but yet with the end setose and the full number of joints, while the gill-branches are a little shorter than in first legs.— Third pair of legs less than half as long as second pair but with the gill quite similar; the two next pairs of legs are small rudiments.

The three anterior pairs of pleopods have the endopod almost half as long as the exopod and distally setiferous; in the two posterior pairs the exopod is well developed, setiferous, while the endopod is small and naked.— Sixth abdominal segment as usually conspicuously longer than in the intermediate stage; its uropods reach somewhat beyond the middle of the telson (fig. 3e).— The telson (figs. 3e and 3f) is a little more than four times as long as broad and slightly broader at the base than somewhat before the end; the terminal margin is a good deal shorter than in the preceding stage, but still with the seven spines, which are even somewhat smaller than before; among the postero-lateral spines

the two outer pairs are nearly as in the preceding stage, but the inner pair are almost twice as broad.

Length of the specimen described 3.7 mm.

Remarks.— By the distally broad and emarginate frontal plate the larvae of Nyctiphanes and Pseudeuphausia differ strongly from those of all other Euphausiacea. The above-described larvae were chosen among a good number of larvae and young and adult specimens from Sta. 4655, Nov. 12, 1904, Surface. Young specimens with the frontal plate distally emarginate and the characteristic lobe of first antennular joint high but not yet fully developed have been described on p. 228. This lobe begins to protrude conspicuously in a specimen measuring about 4.5 mm., and in this specimen the telson has nearly acquired its final shape. Specimens measuring 4.5–5 mm. are therefore easy to determine by aid of the lobe mentioned as Nyctiphanes, for *Pseudeuphausia latifrons* G. O. S. does not possess such a high protuberance; the differences between larvae of *Nyctiphanes simplex* still without the antennular lobe and stages of Pseudeuphausia of the same size are pointed out below.

The larvae described show that they acquire a rather considerable size before the appendages are half developed and before the end of the telson begins to lose its larval armature, though adult specimens are rather small. The distal process of first antennular joint remains very long until the specimens are considerably more than half grown, and the dorsal carina of the carapace is very small even in the youngest larva described.

Pseudeuphausia latifrons G. O. Sars.

Plate 12, figs. 4a–4b.

As stated above, Dr. Agassiz collected at the Fiji Islands a number of specimens, among which are a few larval forms; and from the "Siboga" I have several larvae in the Furcilia- and Calyptopis-stages. And they are mentioned chiefly for comparison with those of *Nyctiphanes simplex*.

The larvae of Pseudeuphausia differ from those of *Nyctiphanes simplex* especially in three features, viz. they are, when chosen in the same stage, considerably smaller, their antennular peduncles are more slender and the frontal plate is not only *more deeply emarginate*, but the emargination is not rounded, but *angular at the middle*. The anterior and the posterior parts of the youngest Agassiz specimen are rendered in figs. 4a and 4b, and a view on these figures shows that the antennular flagella and the telson are considerably more developed than in the above-described specimen in last Furcilia-stage of Nyctiphanes,

though the specimen is only 3.2 mm., thus as long as the intermediate Furcilia-stage of Nyctiphanes; it may be added that the thoracic legs are also somewhat more developed than in the last Furcilia-stage of Nyctiphanes measuring 3.7 mm. Fig. 4b shows that the telson tapers gradually to the insertion of the outer pair of postero-lateral spines, that the intermediate pair of these spines are very slender, the inner pair somewhat strong with the fine denticles along their inner margin, while the telson itself is produced in an acute spine and the terminal spines are wanting.

A specimen in the intermediate Furcilia-stage (from the "Siboga") is 2.7 mm. long; its pleopods are developed about as in the same stage of Nyctiphanes, while its antennular flagella and two anterior pairs of thoracic legs are a little more developed than in the latter form. But the telson is quite different, as to shape of itself and relative size of the three pairs of postero-lateral pairs similar not to the first but to the last Furcilia-stage of Nyctiphanes, while the terminal transverse margin of telson is short with only three small spines.

Nematoscelis microps G. O. Sars.

Plate 12, figs. 5a–5c.

Last Furcilia-Stage.— The frontal plate is very long, linguiform, longitudinally somewhat excavated, anteriorly broadly rounded at the sides and at the middle produced in a very small, tooth-shaped rostrum (fig. 5b); the dorsal keel of the carapace is long and high, oblong-triangular, with the upper angle rounded and the front margin rather steep, situated a little nearer to the posterior margin than to the rostrum; the tooth on the lateral margins of the carapace is very large, directed much downwards and originating at the posterior margin (fig. 5a).

The eyes have the lower section rather well developed, but the upper section is very small.— The antennular peduncles are rather slender; the process from the first joint does not reach the end of second joint, which is a little more than twice as long as thick and conspicuously shorter and thicker than the third; the flagella are very short, unjointed; the lower with a single terminal seta (omitted in the figures).— Antennae and maxillipeds completely larval in shape and tegumental surface; the exopod of the maxillipeds a little longer than the endopod.— First thoracic legs somewhat developed; the endopod reaches slightly in front of the end of rostrum, has the full number of joints with last joint terminating in a few spines; a branchial lobe is visible.— Second thoracic legs rather small, with the endopod scarcely twice as long as the exopod and the branchia

lobes somewhat short and broad; of third pair of legs only the branchia is discernible.

The four anterior pairs of pleopods with the exopod well developed, setiferous, while the endopod is very small with a single seta. Fifth pair of pleopods small, with the naked exopod marked off.— The uropods reach considerably beyond the middle of telson; the endopod is longer than the exopod.— Telson tapers in breadth from the base to a little before the outer postero-lateral spines; the distal part is intermediate as to shape and spines between the earlier larval stages and the fully developed specimens; in the earlier stages three pairs of postero-lateral spines and seven terminal spines are found, while in the adult the intermediate pair of lateral spines and all terminal spines are wanting; in the specimen mentioned here the terminal margin is short with three spines, the middle spine much shorter than the submedian spines, each of which has a strong spiniform denticle on each side before the middle; furthermore, the intermediate pair of postero-lateral spines are lost, while the inner pair are extremely broad, very long and furnished with a number of fine spines on the major proximal part of the inner margin.

The specimen described is 3.5 mm. long.

Remarks.— The shape and tegument with spines of the first pair of thoracic legs proves that the specimen — taken at Hyd. Sta. 3789, Lat. 2° 38′ N., long. 137° 22′ W., September 9, 1899, Surface — belongs to the genus Nematoscelis; furthermore among the species of this genus it must, according to the shape of the eyes and the strong development of the dorsal keel, belong to either *N. microps* G. O. S. or *N. gracilis* H. J. H. And judging from the very high and anteriorly steep dorsal keel I have referred it to *N. microps*.

Whether the specimen described shall be referred to the last Furcilia-stage or the first Cyrtopia-stage is almost a matter of free choice. But it may be of some interest to compare it with the above-described larva of *Euphausia distinguenda*. In both larvae the four anterior pairs of pleopods are setiferous, the thoracic legs are nearly equally developed and the end of the telson has only three marginal spines, but in *E. distinguenda* the intermediate postero-lateral pair of spines which have been lost in Nematoscelis, are still preserved, while, on the other hand, the antennular flagella are very short and unjointed in the latter, but somewhat elongate and three-jointed in the former species. This is a new instance of the above-mentioned fact that as to the consecutive order of the development of appendages and telson considerable differences are found in this order.

Stylocheiron carinatum G. O. Sars.

Plate 12, figs, 6a–6d.

Intermediate Furcilia-Stage (figs. 6a–6c).— The frontal plate with rostrum constitutes a rather large triangle almost as long as broad and with the lateral margins somewhat concave and the end very acute; the dorsal keel of the carapace is low and placed much behind its middle; the lateral margins of the carapace are without any tooth.

The eyes have the lower section well developed, while the upper is small.— The antennular peduncles are rather slender; the process from first joint reaches a little beyond the end of next joint; second joint almost twice as long as broad, somewhat shorter than the third; flagella unjointed, upper flagellum much shorter and thinner than the lower which is about half as long as third peduncular joint.— Antennae and maxillipeds showing the usual larval development; two anterior pairs of thoracic legs rudimentary.

First pair of pleopods with the exopod setiferous; the two following pairs are very oblong, undivided; the posterior pairs rudimentary, scarcely visible below the margin of the lateral plates.— Sixth abdominal segment as long as the sum of the two preceding segments.— The uropods reach much beyond the middle of the telson.— Telson is four and a half times as long as broad, with the distal part somewhat narrower than the proximal; the terminal margin (fig. 6c) is long, with seven rather long, naked spines, increasing in length from the median spine to the subangular pair; the intermediate pair of postero-lateral spines are very long and strong, a little longer than the inner pair and both pairs with about five or six fine spines along a good part of their inner margin; the proximal third pair of the postero-lateral spines are rather small.

The specimen is 2.8 mm. long; it is somewhat poorly preserved so that I may have committed some inaccuracy in the appendages on fig. 6a.— The specimen is from Sta. 4611, October 18, 1904, Surface.

Last Furcilia-Stage (fig. 6d).— The triangle formed by the frontal plate and rostrum in the main as in the preceding stage, but the lateral margins are nearly straight; the dorsal keel of the carapace is placed a little more forwards but still considerably behind the middle.— Eyes a little more developed.— Antennulae with the process from first peduncular joint a little shorter and the still undivided lower flagellum conspicuously longer than in the former stage.— Endopods of first and second pairs of thoracic legs more than half developed, with the full number of joints, and the relative size, shape, and tegumental

surface with setae of the two distal joints of second pair in the main as in fully developed specimens; third pair of legs almost rudimentary; branchiae rudimentary.

The three anterior pairs of pleopods with the endopod very small though terminating in a seta and the exopods well developed; the two posterior pairs are smaller, with the exopod setiferous while the endopod is rudimentary, without any seta.— Telson more slender than in the preceding stage; its terminal part between the inner postero-lateral spines considerably produced, the terminal margin transverse but shorter and with only five spines proportionately smaller than in the preceding stage; the inner pair of postero-lateral spines with the proximal half a little broader than in the preceding stage and considerably broader than the intermediate pair, which are more slender than in preceding stage.

Length of the specimen described 3 mm.— It was taken at Sta. 4588, October 12, 1904, Surface.

Remarks.— The shape and setae of the two distal joints of the second elongate pair of legs prove beyond doubt that the last-named specimen belongs to *Stylocheiron carinatum* G. O. S. And a comparison between this specimen and the specimen in the intermediate Furcilia-stage gives the result, that both belong to the same species. And as nothing was known on the larval stages of any species of the aberrant genus Stylocheiron I find it useful to give here what I can, though the younger specimen is not well preserved. The larvae of *S. carinatum* differ from those of Nyctiphanes, Thysanopoda, Euphausia, Pseudeuphausia, and Nematoscelis by having no denticle on the lower margin of the carapace; I think that this feature affords a good generic character; yet it may be very possible that the hitherto unknown larvae of the genus Nematobrachion agree with Stylocheiron in possessing no marginal denticles. The larvae of Stylocheiron agree, as might be expected, with those of Nematoscelis (and probably of Thysanoëssa) in having the two distal peduncular joints of the antennulae more slender than in those of the other genera mentioned, but they differ from the larvae of Nematoscelis by the shape of the frontal plate and by having the dorsal keel of the carapace smaller and remarkably far behind the middle. But judging from the two above-described larval stages of *S. carinatum* the development and structure of the larvae of the genus Stylocheiron seems to deviate but little from other genera of the order.

THE DISTRIBUTION OF THE EUPHAUSIACEA.

As already stated, the Agassiz Expedition 1904–1905 in the tropical and subtropical East Pacific secured thirty-nine species of the order Euphausiacea, thus a little more than half of the species known from all Oceans together. Among these thirty-nine species nineteen are at present known both from the Atlantic and from the Indian Ocean, eight from the Atlantic, but not from the Indian Ocean, five from the Indian Ocean (in the main from the Indian Archipelago) but not from the Atlantic; thus thirty-two of the thirty-nine of the species enumerated here from the East Pacific are known from at least one of the two other great Oceans. And I think that in no other order of Invertebrates 82 p. c. of the species known from the warm area of the East Pacific are also known either from one of the two other Oceans or from both! Seven species remain; among these one, viz. *Euphausia gibba* G. O. S., is also known from the West Pacific (between Api and Cape York), and a second, *E. pacifica* H. J. H. is widely distributed in the North Pacific and has been taken several times near Japan and Corea. Deducting these forms the following five species:— *Nyctiphanes simplex* H. J. H., *Euphausia eximia* H. J. H., *E. distinguenda* H. J. H., *E. lamelligera* H. J. H., and *E. mucronata* G. O. S. are known only from the East Pacific, but one among them *E. mucronata* has also been captured off Chile, thus more southwards, and a second, *Nyctiphanes simplex*, is known from the Gulf of California and another location at Lat. $35\frac{1}{2}^{\circ}$ N. Three species remain hitherto not known to me from any Station outside the area explored in 1904–1905!

As to the distribution within the area explored in 1904–1905 of the species taken at numerous localities I do not venture to say a great deal; an investigation of this kind must be connected with a detailed study of currents and temperatures. For the majority of the species in question I have in the passage on distribution pointed out the limits of the occurrence within the area explored, but I do not venture to attempt a more general treatment. Only one interesting detail I may call attention to. When two closely allied species, as *Euphausia diomedeae* Ortm. and *E. mutica* H. J. H., *Nematoscelis microps* G. O. S. and *N. gracilis* H. J. H., were both taken at numerous Stations, they were only taken together at some few Stations, and in one part of the area one of such two allied species was very common but quite wanting in another part, while the second species, which was absent in the first part, was common in the other.

Our knowledge of the bathymetrical occurrence and distribution is rather

imperfect, but some points may be mentioned. No species is a surface form to any degree comparable with *Siriella thompsonii* M. Edw. or *S. gracilis* Dana (comp. the statements on p. 193 and p. 194). The great majority of the species were taken only in "300 fms. to surface," but the material in the Copenhagen Museum proves that three such species, viz. *Thysanopoda tricuspidata* M. Edw., *T. aequalis* H. J. H., and *Euphausia pseudogibba* Ortm. have not infrequently been taken at the surface. The lists of Stations from the Agassiz Expedition together with the Copenhagen material shows that *Euphausia tenera* H. J. H., *E. lamelligera* H. J. H., the members of the *krohnii*-group, viz. *Euphausia eximia* H. J. H., *E. diomedeae* Ortm., *E. mutica* H. J. H., *E. brevis* H. J. H., (and *E. recurva* H. J. H.), and *Stylocheiron carinatum* G. O. S., were frequently taken at the surface. The Agassiz Stations show that full-grown specimens of *Nematoscelis gracilis* H. J. H. were never taken at the surface and generally in "300 fms. to surface," but that immature or generally even small specimens were taken at the surface at a few Stations. With the above-named exceptions the species of the genera Thysanopoda, Nematoscelis, Nematobrachion, and Stylocheiron have very rarely or never been taken at the surface. Specimens of *Bentheuphausia amblyops* G. O. S. have been captured at seven Stations in "300 fms. to surface," but all specimens with a single exception seem to be immature, and judging from the Monaco material the adults live generally in greater depths. Finally the adults of the two gigantic species *Thysanopoda cornuta* Illig. and *T. egregia* probably live always in great depths, and adult males of *T. monacantha* Ortm. are probably unknown; though Dr. Agassiz secured specimens of the last-named species at eighteen Stations in "300 fms. to surface" the males at hand seem to be immature.

It may still be mentioned that specimens of two species, *Euphausia distinguenda* H. J. H. and *Nematoscelis gracilis* H. J. H., were found in the bottom of the Tanner net from 300 fms. Of the first-named species both adult and especially immature or small specimens were also taken at the surface, while of *N. gracilis* only young specimens were taken a few times at the surface, numerous adult specimens from many Stations generally in "300 fms. to surface."

Pseudeuphausia latifrons G. O. S., which was taken at the Fiji Islands but not in 1904–5, may be mentioned separately. According to our knowledge, especially from the "Siboga," this species seems to live rather near the coasts, frequently in shallow water, and has, for instance, been captured at a number of anchorages.

EXPLANATION OF THE PLATES.

PLATE 1.

PLATE 1.

Fig. 1. **Chalaraspis alata** Willemoës-Suhm.

Fig. 1a. Anterior part of the body of an adult male from Sta. 4719, from above; × $\frac{16}{3}$.

Fig. 1b. Anterior part of the body of the same male, from the left side; × $\frac{11}{2}$. o. eye.

Fig. 1c. Right antennal squama of an immature specimen from Sta. 4672, from above; × 13.

Fig. 1d. Left mandible of the same immature specimen, from below; × $\frac{17}{3}$.

Fig. 1e. Left maxillula of the same immature specimen, from below; × $\frac{17}{2}$. 1. first joint; l^1. lobe from first joint; 2. second joint; 3. third joint.

Fig. 1f. Left maxilla of the same immature specimen, from below; × 17. 1. first joint; l^2. lobe from second joint; l^3. lobe from third joint; p. palp.

Fig. 1g. Left maxilliped of the same immature specimen, from below; × 13. The epipod omitted.

Fig. 1h. First left thoracic leg (the appendage behind the gnathopods) of the same immature specimen, from behind; × $\frac{17}{2}$.

Fig. 1i. Last (sixth) left thoracic leg of the same specimen, from behind; × $\frac{17}{2}$.

Fig. 1k. Posterior half of abdomen, with the distal parts of the uropods and telson omitted, of the adult male from Sta. 4719, from the left side; × $\frac{17}{3}$.

Fig. 1l. Fifth and sixth abdominal segments with telson and the right uropod of the same adult male, from above, × $\frac{16}{3}$.

Fig. 2. **Boreomysis media,** sp. nov.

Fig. 2a. Anterior part of an adult female from Sta. 4652, from above; 12.

Fig. 2b. Telson and left uropod of the same specimen, from above; × 16. a. a portion of the right lateral margin of the telson more highly magnified, viz. × 64, in order to show the arrangement and relative size of the lateral spines.

Fig. 3. **Boreomysis fragilis,** sp. nov.

Fig. 3a. Anterior part of a male from Sta. 4679, from above; × 16.

1 Chalaraspis alata Will. Suhm. *2 Borcomysis media n. sp. 3 B. fragilis n. sp.*

H. J. Hansen del. T. N. Møller sc.

PLATE 2.

PLATE 2.

Fig. 1. **Boreomysis fragilis,** sp. nov.

Fig. 1a. Telson and left uropod of the same male, from above; × 22.

Fig. 2. **Hemisiriella abbreviata,** sp. nov.

Fig. 2a. Anterior part of an adult female, from above; × 33.

Fig. 2b. Posterior part of sixth abdominal segment with left uropod and telson of the same female, from above; × 33.

Fig. 2c. Telson of the same specimen, from above; × 51.

Fig. 3. **Gastrosaccus pacificus,** sp. nov.

Fig. 3a. Anterior part of an adult female, from above, × 34.

Fig. 3b. First right pleopod of an adult male, from behind; × 45.

Fig. 3c. Second right pleopod of the same male, from behind; × 45.

Fig. 3d. Third right pleopod of the same male, from behind; × 45. The distal part of the exopod wanting.

Fig. 3e. Fourth right pleopod of the same male, from behind; × 45.

Fig. 3f. Fifth right pleopod of the same male, from behind; × 45.

Fig. 3g. Telson and right uropod of an adult female, from above; × 46.

Fig. 4. **Anchialina obtusifrons,** sp. nov.

Fig. 4a. Anterior part of an adult male, from above; × 20.

Fig. 4b. Left gnathopod of the same male, from behind; × 33.

Fig. 4c. Distal part of the exopod of third right male pleopod, from in front; × 186. a. the lamellar process; b. joint bearing the terminal processes; c. outer very long process, with its secondary branch c^1.; d. median ramified terminal process; e. inner terminal process.

Fig. 5. **Euchaetomera typica** G. O. Sars.

Fig. 5a. Median and left part of the anterior margin of the carapace of an ovigerous female, from above; × 48.

Fig. 5b. Right eye of the same female, from above; × 52.

Fig. 5c. Proximal part of right antenna with the squama of the same female, from above; × 23.

Fig. 5d. Distal part of fourth left leg of the same female, from in front; × 35.

Fig. 5e. End of sixth abdominal segment with telson and left uropod of the same female, from above; × 22.

1 Boreomysis fragilis n sp 2 Hemimysella abbreviata n sp 3 Gastrosaccus pacificus n sp
4 Anchialina obtusifrons n sp 5 Eucheatomera typica G O S

H. J. Hansen del T.W. Moller sc

PLATE 3.

PLATE 3.

Fig. 1. **Euchaetomera plebeja,** sp. nov.

Fig. 1a. Anterior part of a male from Sta. 4676, from above; × 33.

Fig. 1b. End of sixth abdominal segment with telson and left uropod of the same specimen, from above; × 25.

Fig. 2. **Cryptomysis lamellicauda,** gen. et. sp. nov.

Fig. 2a. Anterior part of an adult female, from above; × 32. The specimen is somewhat shrivelled.

Fig. 2b. Left antenna of the same female, from above; × 40.

Fig. 2c. Left mandible of the same female, from below; × 47.

Fig. 2d. Distal part of the same mandible, from below; × 48.

Fig. 2e. Second joint of the palp of the same mandible, from below; × 78.

Fig. 2f. Left maxillula of the same female, from below; × 80.

Fig. 2g. Left maxilla of the same female, from below; × 80.

Fig. 2h. Left maxilliped of the same female, from below; × 45.

Fig. 2i. Left gnathopod of the same female, from below; × 45.

Fig. 2k. Major distal part of the endopod of a thoracic leg of the same specimen; × 45.

Fig. 2l. End of sixth abdominal segment with telson and left uropod of the same specimen, from above; × 32.

Fig. 2m. Telson shown in the preceding figure, from above; × 74.

Fig. 3. **Doxomysis pelagica,** gen. et. sp. nov.

Fig. 3a. Left antenna of the adult female, from below; × 40.

Fig. 3b. Left mandible of the same female, from below; × 56.

Fig. 3c. Distal part of the same mandible, from below; × 88.

Fig. 3d. Left maxilla of the same female, from below; × 90.

Fig. 3e. Left maxilliped of the same female, from below; × 88. Exopod and epipod omitted.

Fig. 3f. Telson of the same female, from above; × 47.

Fig. 3g. Distal part of telson, from above; × 80.

Fig. 4. **Thysanopoda cristata** G. O. Sars.

Fig. 4a. Carapace of an immature specimen from Sta. 4736, from the left side; × $\frac{15}{2}$. A denticle at the lateral margin omitted.

Fig. 4b. Front part of the carapace of an adult male, from above; × 5.

Fig. 4c. Front part of the carapace of the adult male, from the left side; × 8.

1 Euchaetomera plebeja n sp 2 Cryptomysis lamellicauda n gen n sp 3 Boreomysis pelagica n gen n sp
4 Thysanopoda crystallata ccrs

H. J. Hansen del

T.N. Mollett sc

PLATE 4.

PLATE 4.

Fig. 1. **Thysanopoda cristata** G. O. Sars.

Fig. 1a. Left antennular peduncle of the adult male, from the outer side; × 8.

Fig. 1b. Right antennular peduncle of the adult male, from above; × 8.

Fig. 1c. Left antennular peduncle of the young specimen from Sta. 4699, from the left side; × 14.

Fig. 1d. Left maxillula of the immature specimen from Sta. 4736, from below; × 31.

Fig. 1e. Male copulatory organ of left first pleopod, unrolled and seen from behind; × 25. li. inner lobe; lm. median lobe; ls. setiferous lobe — the setae along both margins omitted; lu. auxiliary lobe; p^1. spine-shaped process; p^2. terminal process; p^3. proximal process; p^4. lateral process.

Fig. 1f. Terminal process of the organ shown in fig. 1e, from behind; × 45.

Fig. 1g. Terminal process of the organ shown in fig. 1e, from the inner side; × 50.

Fig. 1h. Distal part of the median lobe of the organ shown in fig. 1e, seen from in front and exhibiting the lateral process and the additional process; × 45.

Fig. 2. **Thysanopoda tricuspidata** H. Milne Edwards.

Fig. 2a. Left maxillula of an adult specimen, from below; × 32. 1. first joint; l^1. lobe from first joint; 2. second joint; 3. third joint; l^3. lobe from third joint; 4. fourth joint or palp; px. pseudexopod.

Fig. 3. **Thysanopoda monacantha** Ortmann.

Fig. 3a. Left maxillula of a probably immature male, from below; × 34. The lettering as in fig. 2a.

Fig. 3b. Inner and median lobes of left copulatory organ of a probably immature male, from behind; × 85. The median lobe has the lateral process and only one additional process.

Fig. 3c. Inner and median lobes of left copulatory organ of another probably immature male, from behind; × 85. p^4. lateral process; p^5. three additional processes.

Fig. 4. **Thysanopoda aequalis** H. J. Hansen.

Fig. 4a. Left maxillula of an adult female, from behind; × 35.

Fig. 5. **Thysanopoda obtusifrons** G. O. Sars.

Fig. 5a. Anterior part of the body of a female, from above; × 15. The setae on left antennula omitted.

Fig. 5b. Anterior part of a female, from the left side; × 14.

Fig. 5c. Left maxillula of an adult male, from below; × 30.

Fig. 5d. Left copulatory organ, unrolled and seen from behind; × 48. p^4. lateral process; p^5. additional process.

Fig. 5e. Inner and median lobes of left copulatory organ, from the inner side; × 60. p^1. spine-shaped process; p^2. terminal process; p^3. proximal process; p^4. lateral process; p^5. additional process; lu. margin of the auxiliary lobe with its minute coupling hooks.

Fig. 5f. Distal part of the proximal process of the organ shown in fig. 5e, from the inner side; × 130.

1 Thysanopoda cristata G.O.S. *2 T. tricuspidata* M.Edw. *3 T. monacantha* Ortm.
4 T. aequalis H.J.H. *5 T. obtusifrons* G.O.S.

H.J. Hansen del. T.S. Møller sc.

PLATE 5.

PLATE 5.

Fig. 1. **Thysanopoda pectinata** Ortmann.

Fig. 1a. Anterior part of a female from Sta. 4719, from above; × 13. The setae on right antennula omitted.

Fig. 1b. Anterior part of a female from Sta. 4705, from the left side; × 12.

Fig. 1c. Front end of the carapace of a male from Sta. 4705, from above; × 12.

Fig. 1d. Left maxillula of a male, from below; × 24. 4. fourth joint or palp, very small and seen through the large pseudexopod.

Fig. 1e. Left copulatory organ, unrolled and seen from behind; × 34. p^1. spine-shaped process; p^2. terminal process; p^3. proximal process; p^4. lateral process; p^5. additional process; p^6. secondary additional process.

Fig. 1f. Distal part of the inner and median lobes of left copulatory organ, seen from the inner side and showing all processes excepting the secondary additional process; × 48.

Fig. 1g. Distal part of the proximal process, seen from the outer side; × 50.

Fig. 1h. The additional process, seen from in front; × 90.

Fig. 1i. Inner lobe with its three processes of left copulatory organ of a small male from Sta. 4705, from behind; × 68.

Fig. 1k. Anterior part of a young specimen, 11 mm. long, from Sta. 4730, from above; × 23. Setae omitted.

Fig. 1l. Anterior part of the young specimen shown in the preceding figure and seen from the right; × 14.

Fig. 1m. Right antennula of the same young specimen, from the right side; × 25.

Fig. 2. **Thysanopoda orientalis** H. J. Hansen.

Fig. 2a. Left maxillula of an adult male, from below; × 32. The palp is seen through the large pseudexopod.

Fig. 2b. Outline of left maxillula of another male, from below; × 20. The figure is given for comparison with fig. 2a in order to show difference in the palp.

Fig. 2c. Left maxilla of an adult male, from below; × 20. 1. first joint; 2. second joint; l^2. lobe from second joint; 3. third joint; l^3. lobe of third joint; ex. exopod.

Fig. 2d. Left copulatory organ, unrolled and seen from behind; × 33. p^4. lateral process; p^5. additional process; p^6. secondary additional process.

Fig. 2e. Terminal process of the same organ, from in front; × 53.

Fig. 2f. Distal part of the proximal process of the same organ, from behind; × 86.

Fig. 2g. Distal part of the proximal process of the same organ, from in front; × 127.

Fig. 2h. Distal part of the proximal process of left organ of another specimen, from behind; × 86.

Fig. 2i. Distal half of the median lobe of the organ shown in fig. 2d, seen from the inner side; × 50. The lettering as in fig. 2d.

1 Thysanopoda pectinata Ortm. 2. T. orientalis H.J.H.

PLATE 6.

PLATE 6.

Fig. 1. (?) **Thysanopoda cornuta** Illig. Young.

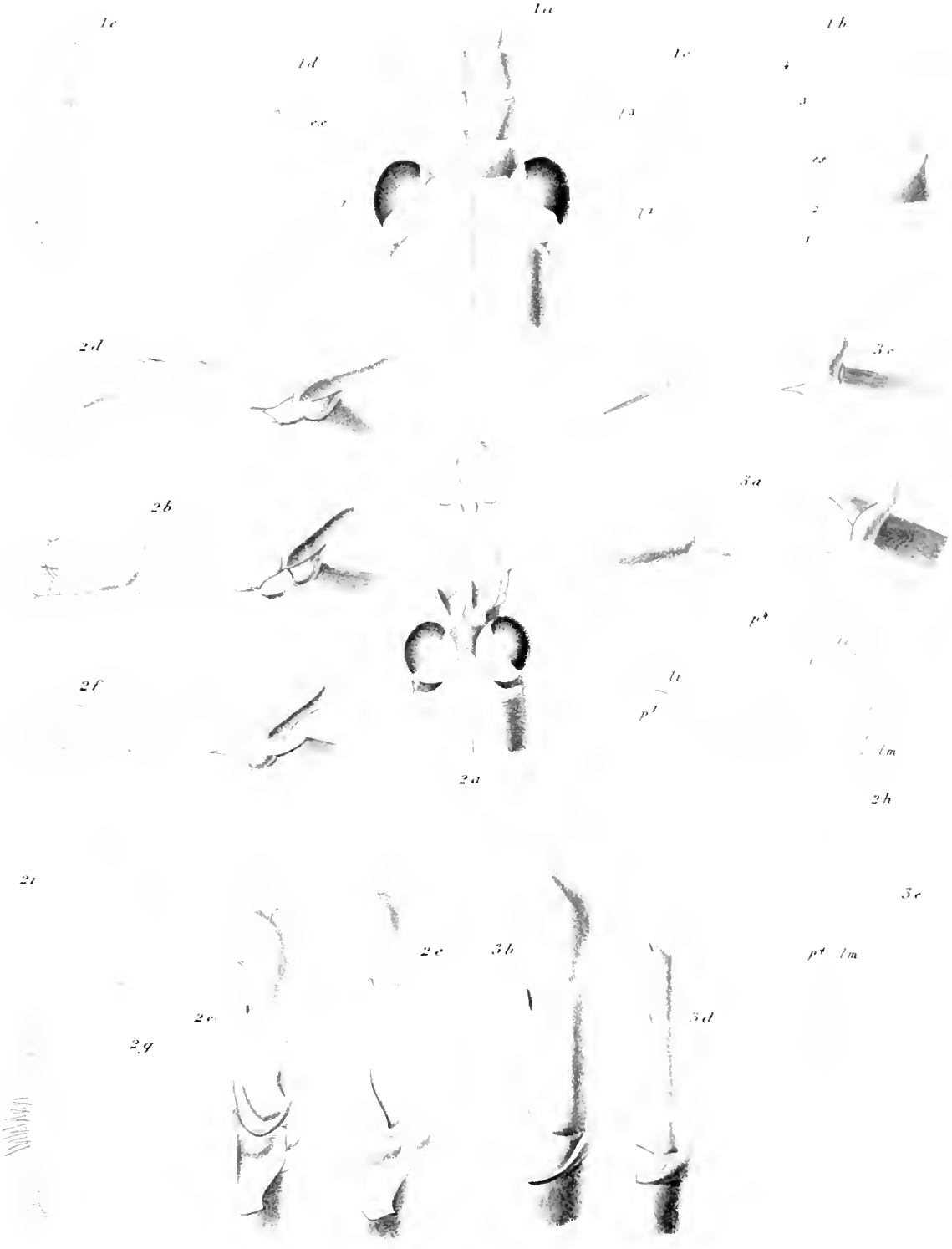
Fig. 1a. Anterior part of the single young specimen, 14.5 mm. long, from above; × 15.
Fig. 1b. Peduncle of right antennula, from above; × 31.
Fig. 1c. Left maxillula, from below; × 34. 1. first joint; l¹. lobe from first joint; 2. second joint; 3. third joint; l³. lobe of third joint; 4. fourth joint or palp; ex. exopod.
Fig. 1d. Left maxilla, from below; × 34. 1. first joint; ex. exopod.
Fig. 1e. Posterior part of abdomen, from above; × $\frac{19}{2}$.

Fig. 2. **Nyctiphanes simplex** H. J. Hansen.

Fig. 2a. Anterior part of an adult male, from above; × 16.
Fig. 2b. Left antennula of a male, from the outer side; × 27.
Fig. 2c. Right antennula of a male, from above; × 26.
Fig. 2d. Left antennula of an adult female, from the outer side; × 28.
Fig. 2e. Right antennula of an adult female, from above; × 27.
Fig. 2f. Left antennula of an immature specimen, from the outer side; × 28.
Fig. 2g. Left maxillula of a female, from below; × 58.
Fig. 2h. Left copulatory organ, unrolled and seen from behind; × 80. li. inner lobe; lm. median lobe; p¹. spine-shaped process; p⁴. lateral process.
Fig. 2i. Major distal part of the inner lobe of the same organ, from behind; × 143.

Fig. 3. **Nyctiphanes australis** G. O. Sars.

Fig. 3a. Left antennula of the adult male, from the outer side; × 22.
Fig. 3b. Right antennula of the same male, from above; × 22.
Fig. 3c. Left antennula of the adult female, from the outer side; × 27.
Fig. 3d. Right antennula of the same female, from above; × 24.
Fig. 3e. Left copulatory organ, unrolled and seen from behind; × 58. lm. median lobe; p⁴. lateral process.



1. Thysanopoda cornuta Illig Ohlang's. 2. Nyctiphanes simplex H.J.H
3. N. australis G.O.S.

H.J. Hansen del. T.N. Møller sc.

PLATE 7.

PLATE 7.

Fig. 1. **Nyctiphanes simplex** H. J. HANSEN. Young.

Fig. 1a. Anterior part of a young specimen measuring 7 mm. in length, from above; × 33. The setae of left antennula omitted.

Fig. 1b. Left antennula of the specimen shown in the preceding figure, from the outer side; × 48.

Fig. 2. **Euphausia eximia** H. J. HANSEN.

Fig. 2a. Anterior part of the body of an adult male, from above; × 14. The setae on left antennula omitted.

Fig. 2b. Peduncle of left antennula of an adult male, from the outer side; × 25.

Fig. 2c. Major part of the peduncle of right antennula of a male, from above; × 25.

Fig. 2d. Distal part of second joint of the peduncle of right antennula of another specimen, a female, from above; × 27.

Fig. 2e. Left copulatory organ, unrolled and seen from behind; × 47. p^2. terminal process; p^3. proximal process; p^4. lateral process.

Fig. 2f. Inner lobe of left copulatory organ of another specimen, from the inner side; × 50. Lettering as in fig. 2e.

Fig. 2g. Median lobe of left copulatory organ of a large specimen, from the inner side; × 42. p^4. lateral process.

Fig. 3. **Euphausia recurva** H. J. HANSEN.

Fig. 3a. Anterior part of the body of an adult male, from above; × 23. The setae on left antennula omitted.

Fig. 3b. Left antennular peduncle of an adult male, from the left; × 39.

Fig. 3c. Major part of the peduncle of right antennula of an adult male, from above; × 36.

Fig. 3d. Left antennular peduncle of an adult female from Lat. 34° 50′ S., long. 25° 30′ E., from the outer side; × 25.

Fig. 3e. Major part of the peduncle of right antennula of the adult female from Lat. 34° 50′ S., long. 25° 30′ E., from above; × 22.

Fig. 3f. Left copulatory organ, unrolled and seen from behind; × 77.

Fig. 3g. Distal part of the terminal process of the organ shown in fig. 3f, from behind; × 140.

Fig. 3h. Terminal process of left organ of another male, from the inner side; × 130.

Fig. 3i. Terminal part of the proximal process of the organ shown in fig. 3f, from behind; × 150.

Fig. 3k. Terminal part of the proximal process of the left organ of another male from Sta. 4576, from behind; × 150.

Fig. 3l. Proximal process of left copulatory organ of a male from Lat. 34° 50′ S., long. 25° 30′ E., from behind; × 80.

Fig. 3m. Terminal part of the proximal process shown in fig. 3l, from behind; × 150.

Fig. 3n. Terminal part of the proximal process of left copulatory organ of another male from Lat. 34° 50′ S., long. 25° 30′ E., from behind; × 150.

Fig. 4. **Euphausia diomedeae** ORTMANN.

Fig. 4a. Anterior part of the body of a male from Sta. 4721, having the rostral plate strongly expanded and the rostrum short; from above; × 15.

Fig. 5. **Euphausia pacifica** H. J. HANSEN.

Fig. 5a. Anterior part of a slightly more than half-grown specimen, from above; × 19.

Fig. 5b. Terminal part of the proximal joint with the basal part of second joint of right antennular peduncle of the specimen shown in fig. 5a, from above; × 50.

1 Nyctiphanes simplex H.J.H. (Young) *2 Euphausia exima* H.J.H.
3 E. recurva H.J.H. *4 E. diomedeae* Ortm. *5 E. pacifica* H.J.H.

H.J. Hansen del. C.N. Møller sc.

PLATE 8.

PLATE 8.

Fig. 1. **Euphausia brevis** H. J. HANSEN.

Fig. 1a. Anterior part of the body of a male, from above; × 32.

Fig. 1b. Left antennular peduncle of a male, from the outer side; × 47.

Fig. 1c. Major part of right antennular peduncle of a male, showing the terminal part of first joint with its lobe, and the whole second joint, from above; × 47.

Fig. 1d. Left copulatory organ, unrolled and seen from behind; × 87.

Fig. 1e. Proximal process of the organ shown in the preceding figure, from behind; × 150.

Fig. 1f. Inner lobe of left copulatory organ of another male, seen from the inner side; × 141.

Fig. 1g. Distal part of the terminal process of the lobe exhibited in fig. 1f, seen from the inner side and a little from in front; × 141.

Fig. 2. **Euphausia gibba** G. O. SARS.

Fig. 2a. Left antennular peduncle of a male, from the outer side; × 25.

Fig. 2b. Left copulatory organ, unrolled and seen from behind; × 52. p^2. terminal process; p^3. proximal process; p^4. lateral process; ln. median lobe, with its finger-like distal part.

Fig. 3. **Euphausia distinguenda** H. J. HANSEN.

Fig. 3a. Anterior part of the body of a male, from above; × 20. The setae on left antennula omitted.

Fig. 3b. Anterior part of the body of a male, from the left side; × 17.

Fig. 3c. Left antennular peduncle of the same male, from the left side; × 35. p. ear-like process at the distal outer upper angle of second joint.

Fig. 3d. Major part of right antennular peduncle of a male, showing the distal part of first joint and the whole second joint, from above; × 35. p. ear-like process at the distal outer upper angle of second joint.

Fig. 3e. Left copulatory organ, unrolled and seen from behind; × 77.

Fig. 3f. Proximal process, p^3., and median lobe with the lateral process; p^4., of left copulatory organ of another specimen, seen from the inner side; × 90.

Fig. 4. **Euphausia lamelligera** H. J. HANSEN.

Fig. 4a. Anterior part of the body of a male, from above; × 23. l. movable lamella from second joint.

Fig. 4b. Anterior part of the body of a male, from the left side; × 18.

Fig. 4c. Left antennular peduncle of a male, from the outer side; × 38.

Fig. 4d. Right antennular peduncle of a male, from above; × 36. l. movable lamella from the end of second joint. The setae omitted.

Fig. 4e. Inner and median lobes of left copulatory organ, seen from the inner side; × 84. p^2. terminal process; p^3. proximal process; p^4. lateral process.

1 *Euphausia brevis* H.J.H. 2 *E. gibba* G.O.S. 3 *E. distinguenda* H.J.H.
4 *E. lamelligera* H.J.H.

H.J.Hansen del. J.N.Møller sc.

PLATE 9.

PLATE 9.

Fig. 1. **Euphausia lamelligera** H. J. HANSEN.

Fig. 1a. Left copulatory organ, unrolled and seen from behind; × 84.

Fig. 2. **Euphausia gibboides** ORTMANN.

Fig. 2a. Anterior part of the body of a male, from above; × 12. The setae on left antennular peduncle omitted.

Fig. 2b. Anterior part of the body of a male, from the left side; × 10. Setae on the antennula omitted.

Fig. 2c. Left antennular peduncle of same male, from the outer side; × 21.

Fig. 2d. Right antennular peduncle, excepting the major part of third joint, of a male, from above; × 20.

Fig. 2e. Left copulatory organ, unrolled and seen from behind; × 34. a. protruding, triangular, acute tubercle from the median lobe; p^2. terminal process; p^3. proximal process; p^4. lateral process.

Fig. 2f. Distal part of the proximal process of the same organ, from behind; × 95.

Fig. 2g. Left copulatory organ almost in the natural position of another male, from the inner side; × 34. Lettering as in fig. 2e.

Fig. 2h. Distal part of the proximal process of the organ shown in fig. 2g, from the inner side; ×95.

Fig. 3. **Euphausia mucronata** G. O. SARS.

Fig. 3a. Anterior part of the body of a male, from above; × 13. The setae on left antennula omitted.

Fig. 3b. Anterior part of the body of a male, from the left side; × $\frac{23}{2}$. Setae on the left antennula omitted. The frontal plate too obtuse.

Fig. 3c. Left antennular peduncle of the specimen shown in fig. 3b, from the outer side; × 23.

Fig. 3d. Right antennular peduncle of a male, from above; × 22. Most of the setae omitted.

Fig. 3e. Left copulatory organ, unrolled and seen from behind; × 46. p^2. terminal process; p^3. proximal process; p^4. lateral process; p^5. additional process.

Fig. 3f. Proximal process of the organ shown in fig. 3e, from behind; × 80.

Fig. 3g. Inner and median lobes of left organ of another male, seen from the inner side; × 57. Lettering as in fig. 3e.

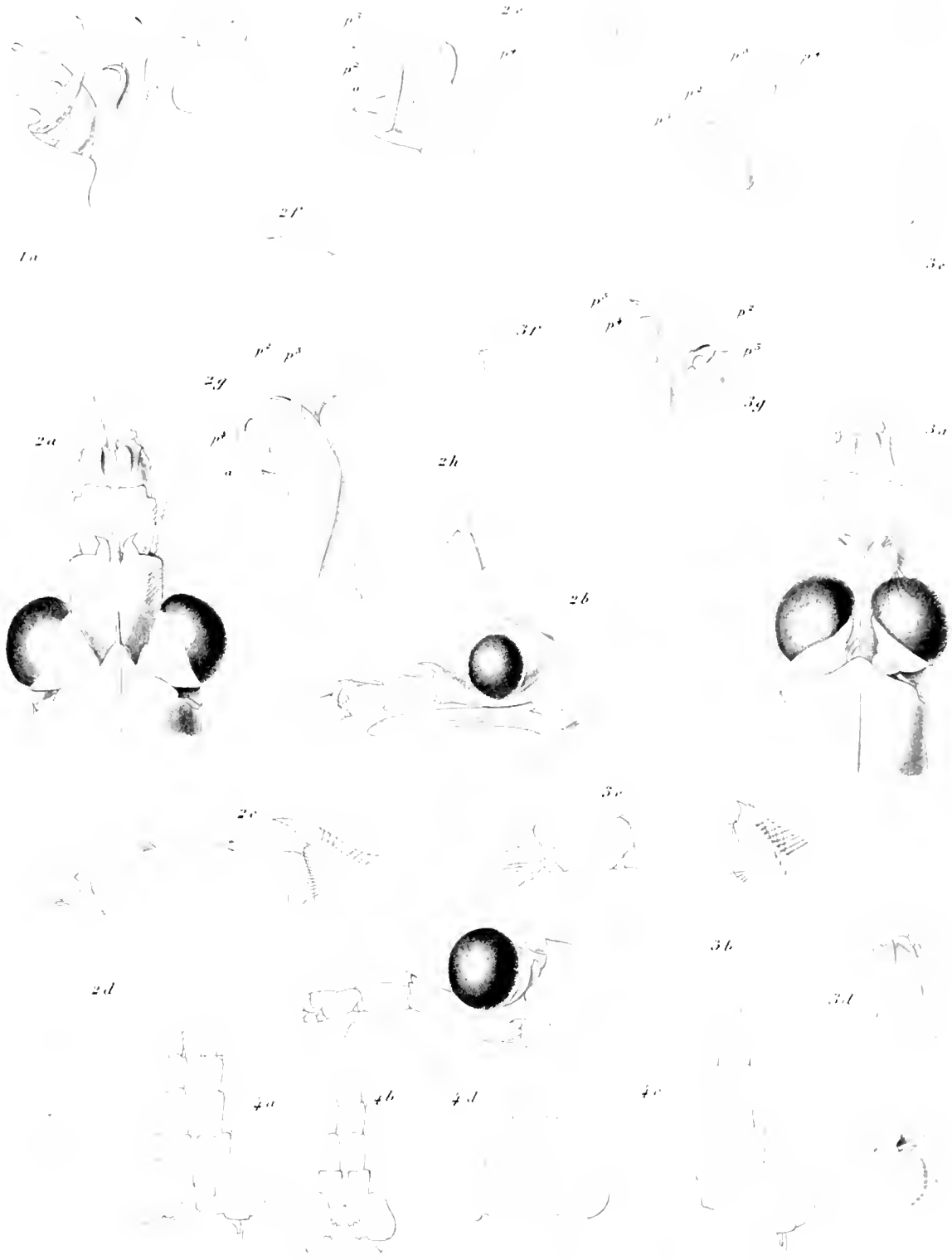
Fig. 4. **Nematoscelis microps** G. O. SARS.

Fig. 4a. Anterior part of an adult male, from above; × 9.

Fig. 4b. Anterior part of an immature male, from above; × 9.

Fig. 4c. Anterior part of an adult female, from above; × 9.

Fig. 4d. Anterior part — the majority of the antennular peduncles omitted — of another adult female in order to show the anomalous rostrum, from above; × 9.



1 Euphausia lamelligera Rdll *2 E gibboides* Ortm *3 E mucronata* G O S

4 Nematoscelis microps G O S

PLATE 10.

PLATE 10.

Fig. 1. **Nematoscelis microps** G. O. SARS.

Fig. 1a. Left maxilla of a female, from below; × 33. All setae omitted.

Fig. 1b. Inner and median lobes of left copulatory organ of an immature male, from behind; × 83.

Fig. 2. **Nematoscelis gracilis** H. J. HANSEN.

Fig. 2a. Left maxilla of a female, from below; × 33. All setae omitted.

Fig. 3. **Nematoscelis tenella** G. O. SARS.

Fig. 3a. Left maxillula of a female, from below; × 40.

Fig. 3b. The distal nearly spiniform seta from the end of the palp of the maxillula shown in fig. 3a, from below; × 160.

Fig. 3c. Left maxilla of the same female, from below; × 40.

Fig. 4. **Nematobrachion boopis** CALMAN.

Fig. 4a. Left maxillula of a female, from below; × 26.

Fig. 4b. Left maxilla of the same female, from below; × 26.

Fig. 4c. The inner, the median and the auxiliary lobes of left copulatory organ, unrolled and seen from behind; × 44. p^1. spine-shaped process; p^2. terminal process; p^3. proximal process; p^4. lateral process; p^5. additional process.

Fig. 4d. The inner lobe of the same copulatory organ, seen from the outer side; × 80. The lettering as in fig. 4c.

Fig. 5. **Nematobrachion flexipes** (ORTMANN).

Fig. 5a. Anterior part of the body of a male, from above; × 12. The setae on left antennula omitted.

Fig. 5b. Anterior part of the body of the same male, from the left side; × 10.

Fig. 5c. Left antennular peduncle of the same male, from the outer side; × 20.

Fig. 5d. Distal part of second peduncular joint, with the basal portion of third joint of left antennula of a female, from above; × 24.

Fig. 5e. Left maxillula of a female, from below; × 32.

Fig. 5f. Left maxilla of the same female, from below; × 32.

Fig. 5g. The abdominal segments of a female, from the left side; × $\frac{1}{3}$.

Fig. 5h. Left copulatory organ, unrolled and seen from behind; × 45.

Fig. 5i. The inner lobe with its three processes of left copulatory organ of another male, from behind; × 90.

Fig. 5k. The inner lobe shown in fig. 5i, seen from the outer side; × 90. The lettering as on fig. 4c and fig. 4d.

Fig. 5l. The distal portion of the proximal process of the lobe shown in fig. 5i, from behind; × 220.

Fig. 5m. The distal portion of the proximal process of left copulatory organ of a third male, seen as from the end of the inner lobe; × 220.

Fig. 6. **Nematobrachion sexspinosus** H. J. HANSEN.

Fig. 6a. Left maxillula of a male, from below; × 25. pex. pseudexopod.

1 Nematoscelis microps G.O.S. 2 N. gracilis H.J.H. 3 N. tenella G.O.S.
4 Nematobrachion boopis Calm. 5 N. flexipes Ortm. 6 N. sexspinosus H.J.H.

H.J. Hansen del. C. Moller sc.

PLATE 11.

PLATE 11.

Fig. 1. **Nematobrachion sexspinosus** H. J. Hansen.

Fig. 1a. Anterior part of the body of a male, from the left side; × $\frac{15}{2}$.

Fig. 1b. Left antennular peduncle of the same male, from the outer side; × 13.

Fig. 1c. Distal part of second peduncular joint with the basal part of third joint of left antennula of the same male, from above; × 20.

Fig. 1d. Left maxilla of a male, from below; × 25.

Fig. 1e. The four posterior abdominal segments of a male, from the left side; × $\frac{9}{2}$.

Fig. 1f. Major part of the same segments as shown in fig. 1e, from above; × 7.

Fig. 1g. The inner, the median, and the auxiliary lobes of left copulatory organ, unrolled and seen from behind; × 40.

Fig. 1h. Inner lobe with its processes of the same copulatory organ, from behind; × 78.

Fig. 1i. Distal half of the terminal process of the same organ, seen from the outer side; × 80.

Fig. 2. **Stylocheiron carinatum** G. O. Sars.

Fig. 2a. Left maxillula of a female, from below; × 58.

Fig. 2b. Left maxilla of the same female, from below; × 58.

Fig. 3. **Stylocheiron suhmii** G. O. Sars.

Fig. 3a. Left eye with stalk of a male, seen with the light transmitted and the lower half somewhat diagrammatic, from the outer side; × 46.

Fig. 3b. Sixth abdominal segment of a male, from the outer side; × 46.

Fig. 4. **Stylocheiron longicorne** G. O. Sars.

Fig. 4a. Left maxillula of a female, from below; × 42.

Fig. 4b. Left maxilla of the same female, from below; × 42.

Fig. 5. **Stylocheiron abbreviatum** G. O. Sars.

Fig. 5a. Anterior part of an adult male (from Sta. 4734), from the left side; × scarcely 9. a^2. last peduncular joint of the endopod of the left antenna; l^2. second left thoracic leg — the distal half with the chela omitted; mxp. left maxilliped.

Fig. 5b. Third peduncular joint with both flagella of left antennula of the same male, from the outer side; × 15.

Fig. 5c. Third peduncular joint with the whole upper flagellum and the major part of the lower flagellum of the male left antennula shown in fig. a, from above; × 15.

Fig. 5d. Left maxillula of a female from below; × 38. s. the distal spine on the end of the palp more highly magnified, viz. × 128.

Fig. 5e. Left maxilla of the same female, from below; × 38.

Fig. 5f. The inner and the median lobes of left copulatory organ, unrolled and seen from behind; × 185. p^1. spine-shaped process; p^2. terminal process; p^3. proximal process; p^4. lateral process.

1 Nematobrachion sexspinosus ♂♀ *2 Stylocheiron carinatum* ♂♀ *3 S. Suhmii* ♂♀ *4 S. longicorne* ♂♀ *5 S. abbreviatum* ♂♀

H.J. Hansen del. T.S. Møller sc.

PLATE 12.

PLATE 12.

Larval Stages of Euphausiacea.

Fig. 1. **Thysanopoda** sp. (*T. monacantha* Ortmann. aff.).

Fig. 1a. First Furcilia-stage; length 3.7 mm. The animal, from the left; × 21. mxp. maxilliped.
Fig. 1b. Anterior part of the same larva, from above; × 37. Setae and antenna on the right side omitted.
Fig. 1c. Posterior part of abdomen with right uropod of the same larva, from above; × 30.
Fig. 1d. Posterior part of telson of the same larva, from above; × 80.
Fig. 1e. Last Furcilia-stage; length 5.0 mm. The animal, from the left side; × 21. mxp. maxilliped.
Fig. 1f. Anterior part of the specimen shown in fig. 1e, from above; × 28. The distal part of left antennula, right antenna, and most setae omitted.
Fig. 1g. Distal part of telson of the specimen shown in fig. 1e, from above; × 87.

Fig. 2. **Euphausia distinguenda** H. J. Hansen.

Fig. 2a. Anterior half of a larva in the last Furcilia-stage; from the left; × 35. The animal is 2.8 mm. long.
Fig. 2b. Anterior part of the same specimen, from above; × 49. The setae on right antennula omitted.
Fig. 2c. Distal part of telson of the same specimen, from above; × 82.

Fig. 3. **Nyctiphanes simplex** H. J. Hansen.

Fig. 3a. Cephalothorax and the three anterior abdominal segments of a larva in the intermediate Furcilia-stage, from the left; × 26. mxp. maxilliped. The animal is 3.2 mm. long.
Fig. 3b. Anterior part of the same specimen, from above; × 30.
Fig. 3c. Posterior part of abdomen of the same specimen, from above; × 30. Right uropod omitted.
Fig. 3d. Distal part of telson of the same specimen, from above; × 83.
Fig. 3e. Posterior part of abdomen with left uropod of a larva in last Furcilia-stage, from above; × 29. The animal is 3.7 mm. long.
Fig. 3f. Distal part of the telson shown in fig. 3e, from above; × 83.

Fig. 4. **Pseudeuphausia latifrons** G. O. Sars.

Fig. 4a. Anterior part of a larva in a Cyrtopia-stage, from above; × 32 The animal is 3.2 mm. long.
Fig. 4b. Posterior part of abdomen with right uropod of the same larva, from above; × 32.

Fig. 5. **Nematoscelis microps** G. O. Sars.

Fig. 5a. Larva in the first Cyrtopia-stage, from the right; × 25. The animal is 3.5 mm. long.
Fig. 5b Head with eyes and antennulae of the same specimen, from above; × 39.
Fig. 5c. End of telson of the same specimen, from above; × 93.

Fig. 6. **Stylocheiron carinatum** G. O. Sars.

Fig. 6a. Larva in the intermediate Furcilia-stage, from the right; × 30. The animal is 2.8 mm. (On possible inaccuracies in the figure see page 293).
Fig. 6b. Head with eyes and antennulae of the same specimen, from above; × 46. The setae omitted.
Fig. 6c. Posterior part of telson of the same specimen, from above; × 140.
Fig 6d. Cephalothorax and first abdominal segment of a larva in the last Furcilia-stage, from the right; × 30. The animal is 3 mm. long.

Larval Stages of Euphausiacea

1 Thysanopoda sp. 2 Euphausia distinguenda 3 Nyctiphanes simplex
4 Pseudeuphausia latifrons 5 Nematoscelis microps 6 Stylocheiron carinatum

H.J. Hansen del. T.N. Møller sc.

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